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1810

1837
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THE

American Tutor's Assistant

REVISED;

[illegible] Zachariah [redacted]

OR,

A COMPENDIOUS SYSTEM OF

PRACTICAL ARITHMETIC;

[redacted] USEFUL SCIENCE,

CONCISELY DEFINED, METHODICALLY ARRANGED, AND
FULLY EXEMPLIFIED.

THE WHOLE

PARTICULARLY ADAPTED TO THE EASY AND REGULAR
INSTRUCTION OF YOUTH IN OUR AMERICAN SCHOOLS.

Originally compiled by sundry Teachers in and near Philadelphia; now Revised, and an additional number of Examples given in money of the United States.

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……

1810.

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D. CALDWELL, Clerk of the
District of Pennsylvania.

Lately published and for sale by Joseph Crukshank, price 75 cents. A Key to the American Tutor's Assistant, revised; in which all the sums necessary for a learner are wrought at large.

Benjamin Hallowell

PREFACE.

THE former impreſsions of *The American Tutor's Assistant* having been well received by the public, the Proprietor has been induced to revise it, and has now made some amendments and additions, which he presumes will render it more acceptable to teachers.

To avoid increasing the size and price of the book, some parts have been omitted, to make room for matter considered of more eſsential use.

To this edition is added, a course of Book-keeping, according to the method of Single Entry, with a description of the books, and directions for using them.

Hundreds of Millions	*Tens of Millions*	*Millions*	*Hundreds of Thousands*	*Tens of Thousands*	*Thousands*	*Hundreds*	*Tens*	*Units*
9	8	7	6	5	4	3	2	1
Millions,			*Thousands.*			*Units.*		

CONTENTS.

NUMERATION, - Page 1
Simple Addition, - 2
Simple Subtraction, - 5
Simple Multiplication, - 6
Simple Diviſion, - 9
Table of Coins, &c. - 13
Federal Money, - 14
Addition of Dollars and Cents, 15
Subtraction of Dollars & Cents, 16
Multiplication of Dolls. & Cts. 17
Diviſion of Dollars & Cents, 18
Compound Addition, - 19
Compound Subtraction, - 30
Compound Multiplication - 38
Compound Diviſion, - 44
Reduction, - - 49
Single Rule of Three, - 58
Inverſe Proportion, - 63
Double Rule of Three, - 67
Practice - - - 72
Tare & Trett, - 80
Simple Intereſt - - 84
Inſurance, Commiſſion, &c. 90
Compound Intereſt, - 98
Rebate or Diſcount, - 99
Equation - - - 101
Barter, - - 102
Loſs and Gain, - - 104
Fellowſhip, - - - 106
Exchange, - - - - 109
Vulgar Fractions, - - 117
Decimal Fractions, - 133
Addition of Decimals, - 134
Subtraction of Decimals, 135
Multiplication of Decimals, 135
Diviſion of Decimals, - 136
Reduction of Decimals, - 138
Single Rule of Three in Deci. 142
Double Rule of Three in De. 144
Involution - - 145
Evolution, - - 146
The Square Root, - - 147
The Cube Root, - 149
Roots of all Powers, - 152
Arithmetical Progreſſion, - 153
Geometrical Progreſſion. - 156
Simple Intereſt by Decimals, 158
Alligation, - - - 159
Single Poſition, - - 164
Double Poſition, - - 165
Permutation & Combination. 168
Duodecimals, - 169
Addition of Duodecimals, 169
Subtraction of Duodecimals, 169
Multiplication of Duodecimals, 170
Promiſcuous Queſtions, - 174

Explanation of Characters.

Significations

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Math.
Travers
10-1-73

ARITHMETIC.

ARITHMETIC is the art of computing by numbers. It has five principal rules for its operations, *viz.* numeration, addition, subtraction, multiplication, and division.

NUMERATION.

NUMERATION teaches to express numbers by figures, set down or named, and consists of two parts, *viz.*

First, the right placing of them.

Second, The true valuing of each figure, in its proper place; both which are exhibited in the following

TABLE.

Hundreds of Millions	*Tens of Millions*	*Millions*	*Hundreds of Thousands*	*Tens of Thousands*	*Thousands*	*Hundreds*	*Tens*	*Units*	
								1	*One.*
							2	1	*Twenty-one.*
						3	2	1	*Three Hundred and twenty-one.*
					4	3	2	1	4 *Thousand* 321
				5	4	3	2	1	54 *Thousand* 321
			6	5	4	3	2	1	654 *Thousand* 321
		7	6	5	4	3	2	1	7 *Million* 654 *Thousand* 321
	8	7	6	5	4	3	2	1	87 *Million* 654 *Thousand* 321
9	8	7	6	5	4	3	2	1	987 *Million* 654 *Thousand* 321

The above table is comprised in the following:—

Hundreds of Millions	*Tens of Millions*	*Millions*	*Hundreds of Thousands*	*Tens of Thousands*	*Thousands*	*Hundreds*	*Tens*	*Units*
9	8	7	6	5	4	3	2	1
Millions,			*Thousands.*			*Units.*		

Nine figures are sufficient to express any number in common practice: Nevertheless, the following table may be thought necessary.

Nonillions	*Octillions*	*Septillions*	*Sextillions*	*Quintillions*
857342,	162486,	345986,	437916,	423147,
Quadrillions	*Trillions*	*Billions*	*Millions*	*Units*
248016,	235421,	261734,	368149,	623137.

EXAMPLES.

In figures express the following numbers.

One hundred and six.

Five hundred and thirty-eight.

Six thousand and seventy-four.

Twelve thousand, five hundred and ten.

Forty-five thousand, six hundred and one.

Two hundred fifty-one thousand, six hundred.

Eight million, one hundred forty-two thousand and six.

Sixty-five million, one hundred four thousand and ninety.

Five hundred and two million, three hundred and four thousand.

Nine hundred forty-eight million, six hundred thirty-two thousand, seven hundred and fifty-one.

Numbers are also expressed by letters, and are called Numeral Letters, or Roman Numbers, thus:

1	2	3	4	5	6	7	8	9	10	20	30
I,	II,	III,	IV,	V,	VI,	VII,	VIII,	IX,	X,	XX,	XXX,

40	50	60	70	80	90	100	500	1000
XL,	L,	LX,	LXX,	LXXX,	XC,	C,	D,	M,

1810
MDCCCX.

A letter of less value, standing before one of greater, diminishes, but when placed after increases the value of the greater. Hence, by combining the above letters, other numbers are formed.

SIMPLE ADDITION.

ADDITION of integers is the collecting of several numbers, of like signification, into one sum; as 6 and 8 make 14.

RULE.

RULE.

Place units under units, tens under tens, &c [illegible] begin at the right hand column and add upwards, [illegible] the total, if less than 10; if 10 or more, the right hand figure, and add the left to the next row of figures, which is carrying 1 for every 10; and so proceed to the last column, and there set down the whole of said column.

PROOF.

Perform the addition downward:—Or, add the top line to the sum of all the rest; and, if right, the total will be equal to the first.

EXAMPLES.

	271684	716087	47862178
	728316	283913	52137822
	643868	56786	67856321
	356132	43214	32143679
	786418	89675	68576814
	548679	71648	34231861
Total	3335097		

67148914	86714827	62187654
32851086	57682186	786418
47189613	476829	646826
52810387	276836	34708
37186819	61783248	41682
62813181	27864	8328
71868716	4674	848
68189768	671218	4682
78964321	4168276	61783
67487689	67476363	27168271
53746938	78642176	47183
46957423	608924	98

Application.

Note. In this, and ſome ſucceeding collections, the pupil may be directed to write the queſtion on his ſlate, with vacancies, in which the tutor may inſert other numbers.

1. Add 5856, 3840, 395, 265, 25, and three thousand, seven hundred and eighty-four together. *facit* 1416

2 A man was born in the year 1718, in what year will he be 99 years of age? *answer* in 1817

3 If a person have owing to him on bond 807*l.* in book accounts 1047*l.* in bills and notes 86*l.* and have in cash 478*l.* how much is the amount? *answer* 2418*l.*

4 Admit a bond to be 4687 dols. interest due thereon 178 dols. what is the amount? *answer* 4865 dols.

5 Suppose 5784 dollars in one purse, 588 in another, 84 in a third, and seven hundred and seventy-nine in a fourth, what number is there in them all? *answer* 7235

6 Admit a boy had 357 nuts given him at one time, 127 at another, 78 at another, 378 at another, 57 at another; how many had he in all? *answer* 997

7 Suppose a person dying left his widow 3840d. to his eldest son 6850d. to two other sons each 2584d. to each of his three daughters 1685d. and in other legacies 950d. what is the sum of these bequests? *answer* 21863d.

8 A draper bought 10 bales of cloth, *viz.* No. 1, 2, each 367 yards; No. 3, 4, 5, each 407 yards; No. 6, 7, 8, each 228 yards; No. 9, 10, each 300 yards; how many yards in the whole purchase? *answer* 3239 yards.

9 A grocer bought 8 casks of indigo, *viz.* No. 1, 210*lb.* No. 2, 196*lb.* No. 3, 4, 5, each 205*lb.* No. 6, 184*lb.* No. 7, 125*lb.* No. 8, 1274*lb.* how many *lbs.* in all? *answer* 2604*lb.*

10 A merchant bought 7 bales of cloth, in four of which were 52 pieces, which contained 1352 yards, the other 3 had 40 pieces, and contained 1098 yards; how many pieces and yards were there? *answer* 92 pieces, 2450 yards.

11 If from the creation to the flood be 1650 years, from that to the calling of Abraham 427, from that to the building of the temple 909, thence to the founding of Rome 266, from that to the birth of Christ 752, and since to the present year 1810; how many years since the creation? *answer* 5814

12 How many strokes does a regular clock strike in a week? *answer* 1092

13 There are two numbers, the less is 9876, and their difference twice as many; what is the greater? *answer* 29628

14 Borrowed a sum of money: paid at sundry times 89d. 196d. 226d. 327d. and the remainder to pay is 162d. what was the sum borrowed? *answer* 1000d.

SIMPLE

SIMPLE SUBTRACTION

TEACHETH to take a less number, called the subtrahend, from a greater of the same denomination, termed the minuend, and thereby to shew the difference.

RULE.

Put the less number under the greater, with units under units, tens under tens, &c. then begin at the right hand, and take the lower figure from that above it; but if it be greater than that above, take it from 10, and add the upper figure to the remainder, set down the result, and carry 1 to the next place; and so proceed.

PROOF.

Add the remainder to the less number, and the sum, if right, will be equal to the greater.—

EXAMPLES.

From	4736985	9736214	18346152	74614328
Take	1514863	4878946	9804675	70840679
Rem.	3222122	4857268	8541477	3773649
Proof	4736985	9736214	18346152	74614328

From	473648217	648271681	81621261	689081681
Take	97898604	48918692	198718	9908718
Rem.				

Application.

1 Borrowed 1090*l.* and paid 909*l.* how much remains? *answer* 181*l.*

2 A man was born in the year 1718, what is his age in the year 1810? *answer* 92

3 A boy who had one thousand nuts sold 286, gave away 60 and lost 437; how many had he left? *answer* 217

4 There were 4 bags, containing 1st. 34dols. 2d. 50dols. 3d. 100dols. 4th. 150dols. but one of them being lost, only 234 dols. remained; which bag was lost? *answer* 100d. bag.

5 Having a piece of ground 172 feet long, and rented to A at one end 57 feet, and to B 42 feet at the other end; how much was left between them? *answer* 73 feet.

EXAMPLES.

6782158	6874281	2816054
14	15	16
94950212		
5473682	4786824	6789863
17	18	19

CASE 3.

When the multiplier consists of several figures;

RULE.

Make as many products as there are figures in the multiplier, omitting ciphers, and place the first figure of each product exactly under its multiplier; add the products together, and their sum will be the number sought.

Note. If ciphers be in one or both factors at the right hand, annex them to the product.

EXAMPLES.

1	Mul.	7643827	by	23	*facit*	175808021
2		8142630	by	75		610697250
3		9436170	by	920		8681276400
4		3760410	by	4840		18200384400
5		815036000	by	70300		57297030800000
6		1900460	by	161500		306924290000
7		3800920	by	80750		306924290000
8		6247386495	by	27356		170903504957220
9		12494772990	by	13678		170903504957220
10		47001881	by	1140090		53586374509290
11		94003762	by	570045		53586374509290
12		233926899	by	13679508		3200004886285692

Application.

1 Suppose 40 men were concerned in the payment of a debt, and each man paid 2564d. how much was the debt?
answer 102560d.

2 How many square feet are in a floor 46 feet in length and 35 in breadth?
answer 1610

3 If 6876 be multiplied by six thousand, seven hundred and eighty-nine, what is the product? *answer* 67048164

4 Bought 342 bales of linen, in each bale 56 pieces, and in each piece 25 yards; how many pieces and yards were therein? *answer* 19152 pieces, 478800 yards.

5 A merchant bought 7 bales of cloth, in each bale 11 pieces, and in each piece 29 yards; how many pieces and yards were there? *answer* 77 pieces, 2233 yards.

6 Sold 8 bales of linen, in 4 of which were 9 pieces each, and in each piece 27 yards; in the other 4 were 12 pieces each, and in each piece 31 yards; how many pieces and yards were there? *answer* 84 pieces, 2460 yards.

7 A linen draper bought 10 bales of cloth, *viz.* No. 1 2, each 367 yards; No. 3, 4, 5, each 407 yards; No. 6, 7, 8, each 228 yards; No. 9, 10, each 300 yards; how many yards in all? *answer* 3239

8 What is the product of 13578 multiplied by 4938?
answer 67048164

9 Admit an orchard consisting of 126 trees one way, 109 the other, and 1007 apples on each tree; how many trees and apples are in said orchard?
answer 13734 trees, 13830138 apples.

10 A certain island contains 52 counties, each county 42 parishes, each parish 246 houses, and each house 10 persons; how many parishes, houses and persons, are in the island?
answer 2184 parishes, 537264 houses, 5372640 persons.

SIMPLE DIVISION.

DIVISION of integers is the reverse of multiplication, and shews how often one number is contained in another. It consists of four parts, *viz.*

First, The *dividend*, or number to be divided.

Second, The *divisor*, or number to divide by.

Third, The *quotient*, or number sought.

Fourth, The *remainder* (if any) which must be less than the divisor, and of the same name with the dividend.

Simple division is of two kinds, *viz.* short and long.

SHORT

SHORT DIVISION.

Short division is that in which the divisor does not exceed twelve.

RULE.

Seek how often the divisor is contained in the first figure or figures of the dividend, under which set the result; if any remain, conceive it to be prefixed to the next figure, seek how often the divisor is contained therein, and so proceed.

PROOF.

Multiply the quotient by the divisor, adding in the remainder, if any, and the product will be the dividend.

EXAMPLES.

	Dividend		
Divisor	2)7346286	3)5112896	4)37612285
Quotient	3673143	1704298$\frac{2}{3}$	
	2	3	
Proof	7346286	5112896	
	5)97036142	6)74830956	7)91430682
	8)37846210	9)73004881	10)4739017[illegible]
	11)41036294	12)64381259	12)59436828

Note 1. When the diviſor is the exact product of ſome two factors in the multiplication table, firſt divide by one of them, and that quotient by the other.

2. Multiply the firſt diviſor into the laſt remainder, if any, and to that product add the firſt remainder for the true one.

EXAMPLES.

1	Divide	7463521	by	18	*facit* 414640	1	Remainder.
2		73681090	by	48	1535022	34	
3		740043612	by	96	7708787	60	
4		57384659	by	144	398504	83	

LONG DIVISION.

Long division is that wherein the divisor exceeds 12.

RULE.

Take, for the first dividual, as many only of the first figures of the dividend as will contain the divisor; try how often the divisor may be had therein; and set the resulting figure for the first of the quotient; subtract the product of this figure into the divisor from the dividual, and the remainder, with the next figure of the dividend anne[illegible]ill be the second dividual, with which proceed as bef[illegible] &c. till the dividend figures are exhausted.

PROOF.

As in short division.—Or thus: the dividend, less the remainder, divided by the quotient, will quote the divisor.

EXAMPLES.

```
                    Dividend
      Divisor 41) 9 4 9 7 9 ( 2 3 1 6 Quotient
                  8 2               4 1
                -----             -------
                1 2 9           2 3 1 9
                1 2 3         9 2 6 6
                -----         ---------
                  6 7         9 4 9 7 9 Proof.
                  4 1         ---------
                  ---
                2 6 9
                2 4 6
                -----
    Remainder     2 3
                  ---
```

			Quotient.	Rem.
2	Divide 7461389 by	95	*facit* 78540	89
3	5374608 by	671	8009	569
4	9736205 by	2507	3883	1524
5	756390289 by	41659	18156	29485
6	9871369542 by	87648	112625	13542
7	19742712000 by	175296	112625	
8	139736422224 by	476838	293048	
9		293048	476838	

Note. If one or more ciphers be on the right of the divisor, omit them in the operation, separating from the right of the dividend as many figures, which annex to the remainder.

EXAMPLES.

1	Divi. 8317642500	by	814600	*facit*	10210	re. 576500
2	16634132000	by	1629200		10210	
3	87521885000	by	12749000		6865	
4	350087540000	by	27460000		12749	

Application.

1 A person intending to go a journey of 3264 miles, would perform it in 136 days, how many miles must he travel each day? *answer* 24

2 Several boys went to gather nuts, and collected 4275, which when shared among them, each had 855; how many boys were in company? *answer* 5

3 If the expence of erecting a bridge be 5022*l.* to be defrayed equally by 186 persons; how much must be the quota of each? *answer* 27*l.*

4 The quotient of an operation in division is 1763, the dividend 8435955; query the divisor? *answer* 4785

5 What number is that, which being multiplied by 7969, the product will be 1864746? *answer* 234

6 Being desirous to plant 2072 apple trees in 14 rows, how many will be in each row? *answer* 148

7 In 670320 yards, how many pieces and bales, allowing 35 yards in each piece, and 56 pieces in each bale?
answer 19152 pieces, 342 bales.

8 If a cistern containing 15072 gallons be emptied in 4 hours, by 48 equal vents; what quantity is discharged by either adjutage in that time? also how much per hour, admitting the velocity of the fluid to be uniform?
answer 314 gallons, at the rate of 78½ per hour.

9 Divide 42904 Acres of land into 346 equal parts.
facit 124

10 If 45000 dollars be divided among 25 persons; how many is that for each? *answer* 1800

11 Purchased 256 bundles of hemp, weighing 46080 *lbs.* how much is in a bundle? *answer* 180*lb.*

TABLE.

[illegible] value of Coins as they pass in the respective States of the Union, with their Sterling and Federal value.

Names of Coins.	Standard Weight.		Sterling Money of Great Britain.			New Hampshire, Massachusetts, Rhode-Island, Connecticut, and Virginia.			New York and North Carolina.			New Jersey, Pennsylvania, Delaware, and Maryland.			South Carolina, and Georgia.			Federal value. Eagles, Dollars, Dimes, Cents, Mills.
(GOLD.)	dwt.	gr.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	E. D. d. c. m.
A Johannes,	18	0	3	12	0	4	16	0	6	8	0	6	0	0	4	0	0	1 6,000
An Half Johannes,	9	0	1	16	0	2	8	0	3	4	0	3	0	0	2	0	0	8,000
A Doubloon,	16	21	3	6	0	4	8	0	5	16	0	5	12	6	3	10	[illegible]	1 4,933
A Moidore,	6	18	1	7	0	1	16	0	2	8	0	2	5	0	1	8	0	6,000
An English Guinea,	5	6	1	1	0	1	8	0	1	17	0	1	15	0	1	1	9	4,667
A French Guinea,	5	5	1	1	0	1	7	6	1	16	0	1	14	6	1	1	5	4,600
A Spanish Pistole,	4	6	0	16	6	1	2	0	1	9	0	1	8	0	0	18	0	3,773
A French Pistole,	4	4	0	16	0	1	2	0	1	8	0	1	7	6	0	17	6	3,667
(SILVER.)																		
An English or French Crown,	19	0	0	5	0	0	6	8	0	8	9	0	8	3	0	5	0	1,100
The Dollar of Spain, Sweden or Denmark,	17	6	0	4	6	0	6	0	0	8	0	0	7	6	0	4	8	1,000
An English Shilling,	3	18	0	1	0	0	1	4	0	1	9	0	1	8	0	1	0	0,222
A Pistareen,	3	11	0	0	10¾	0	1	2	0	1	7	0	1	6	0	0	11	0,200

All other gold coins, of equal fineness, at 89 cents *per dwt.* and silver at 111 cents *per oz.*

A TABLE of other foreign Coins, &c. with their value in Federal Mo
as eſtabliſhed by a late act of Congreſs.

	E.D.d.c.m.		E.D.d.
Pound Sterling, -	0 4, 4 4 0	Rupee of Bengal -	0 0, 5
Pound of Ireland, -	0 4, 1 0 0	The Guilder of the United Netherlands, -	0 0, 3
Pagoda of India, -	0 1, 9 4 0	Mark Banco of Hamburg,	0 0, 3
Tale of China -	0 1, 4 8 0	Livre Turnois of France,	0 0, 1
Mill-ree of Portugal -	0 1, 2 4 0	Real Plate of Spain, -	0 0, 1
Ruble of Russia -	0 0, 6 6 0		

FEDERAL MONEY.

The denominations are:

10 mills *(m)*	make	1 cent,	*c.*
10 cents	- - -	1 dime,	*d.*
10 dimes	- -	1 Dollar,	*D.*
10 dollars	- -	1 Eagle.	*E.*

The Standard Weight.

	dwt.	*gr.*	
A dime, - -	1	$16\frac{9}{10}$	*Silver.*
A Dollar, -	17	$1\frac{3}{4}$	
An Half Eagle,	5	$14\frac{1}{3}$	*Gold.*
An Eagle, - -	11	$4\frac{2}{3}$	

Note. The Federal ſtandard, for gold and ſilver, is 11 parts fine and 1 part alloy.

Federal money, or money of the United States, may be added, subtracted, multiplied and divided as integers or whole numbers, only separating the different denominations with a point, as fifty-nine eagles, five dollars, nine dimes, five cents, in figures 59,5,9,5: but as dollars and cents are the only denominations commonly used in accounts, the points after the eagles and dimes are omitted, as 595,95, five hundred and ninety-five dollars and ninety-five cents.

Dollars are reduced to cents, by multiplying the number of dollars by 100, or, which is the same thing, by adding two ciphers to the right hand of the number of dollars, as;

In 1 dollar, how many cents?	*answer* 100
In 6 dollars, how many cents?	*answer* 600
In 10 dollars, how many cents?	*answer* 1000

Cents are brought into dollars by dividing by 100, or separating the two last figures to the right hand by a point, which will be cents, and those to the left will be dollars, as,

In 225 cents, how many dollars and cents?	*answer* 2,25
In 506 cents, how many dollars and cents?	*answer* 5,06
In 1250 cents, how many dollars and cents?	*ans.* 12,50

Note. In writing down any number of cents less than 10, a cipher must be prefixed in the place of dimes.

ADDITION.

EXAMPLES.

	D.	C.	E.	D.	d.	c.	m.	D.	C.
	36,	45	36	4,	6	5	3	7356,	33
	43,	24	21	5,	4	3	9	5205,	06
	25,	33	15	3,	8	8	5	1743,	50
	96,	82	64	8,	5	4	8	6534,	25
	27,	64	19	7,	3	2	4	4269,	99
	82,	30	53	9,	8	7	6	2845,	87
Total	311,	78							

E	D	d.	c.	m.	Dols.	Cts.	E.	D.	d.	c.	m.
7	4,	3	8	6	123,	47	57	5,	5	4	3
2	5,	6	1	4	876,	53	42	4,	4	5	7
5	4,	3	2	1	28,	02	9	4,	0	5	
4	5,	6	7	9	71,	98		5,	6	5	
3	4,	5	6	7	9,	09		,	0	6	3
8	9,	0	1	2	,	91	5	8,	0	3	7
32	3,	5	7	9							

Application.

1 Laid out at sundry times, *viz.* at one time 100 dollars, at another 75 cents, at a third 4 dollars 7 mills, and lastly, 19 dollars 4 cents; query the whole expenditure?

answer 123 *D.* 797*m.*

2 How much Federal money equals 1 English guinea, 2 French crowns, and 3 Spanish pistoles? *answer* 18*D.* 186*m.*

3 Add 250 eagles, 9 dollars, 8 dimes, 6 cents and 5 mills together. *facit* 2509,8,6,5

4 Suppose I owe A 462 dollars 50 cents; B 365 dollars 19 cents: C 23 dollars 64 cents; D 86 dollars 92 cents; E 35 dollars 74 cents; and F 84 dollars 33 cents; how much do I owe altogether? *answer* 1058,32

5 Bought a horse for 125 dollars, chair 120 dollars, harness 26 dollars 45 cents, saddle 16 dollars 43 cents, bridle 4 dollars 16 cents, what is the amount of the whole?

answer 292,04

6 A person deposited at bank, 1055 dollars in notes; 260 dollars in gold; 3650 dollars in silver, and 250 cents; how much is the amount? *answer* 4967,50

SUBTRACTION.

EXAMPLES.

	Dols. *Cts.*	*Dols.* *Cts.*	*Dols.* *Cts.*
From	365, 45	4369, 58	2648, 25
Take	233, 23	2637, 50	1876, 14
Rem.	132, 32		

	E. D. d. c. m.	*Dols.* *Cts.*	*E. D. d. c. m.*
From	1 4, 1 2 9	749, 42	347 5, 0 7 2
Take	7, 9 0 2	405, 9	294 2, 8 6 5
Rem.	6, 2 2 7		
Proof	1 4, 1 2 9		

	D. *c.*	*D.* *c.*	*D.* *c.*
Borrowed	3256,49	8436,24	9368,22
Paid	978,65	7523,19	5439,17

Application.

1 A owed Z 43 dollars 75 cents, and paid him on account 24 dollars 33 cents, how much remains unpaid? *ans.* 19,42

2 K having deposited 4967 dollars 50 cents in bank, drew for 3765 dollars 14 cents; what sum has he left? *answer* 1202,36

3 Suppose X had 1965 dollars 44 cents, belonging to Y of New-York, and Y has drawn on him at one time for 96 eagles, afterwards for 550 dollars 33 cents, and again for 69 dollars 29 cents, how much will remain, after paying the three drafts? *answer* 385,82

4 Borrowed 500 dollars 44 cents, paid 204 dollars 56 cents, how much remains due? *answer* 295,88

5 Sent a servant to market with an eagle, who bought beef 1 dollar 33 cents, veal 1 dollar 75 cents, ducks 75 cents, butter 1 dollar 50 cents, vegetables 67 cents, how much change must he return? *answer* 4 dollars.

6 Sent 4700 dollars to the bank; and having drawn checks for 98 dollars 15 cents; 109 dollars 37 cents; and 7 dollars 12 mills; what further sum may I draw for?
answer 448*E.* 5*D.* 4*d.* 6*c.* 8*m.*

7 From 7½ Eagles, deduct 7½ Dollars, and 7½ cents.
facit 6*E.* 7*D.* 4*d.* 2*c.* 5*m.*

MULTIPLICATION.

EXAMPLES.

Multiply	42	376	5345	3976
	,05	,06	,08	,09
Product	2,10			

365	268	424	576
,15	,24	,36	,48
1825			
365			
54,75			

E. D. d. c. m.	*Dols. Cts.*	*D. d. c. m.*	*D. d. c. m.*
84 7, 7 4 2	439, 17	9, 0 4 5	7, 3 6 8
6	7	29	30
508 6, 4 5 2			

Application.

1 Bought 456*lb.* of cheese, at eight cents per *lb.* what is the amount? *answer* 36,48

2 How much will 896*lb.* of loaf sugar come to at 23 cents per *lb.* *answer* 206,08

3 Find the cost of 976 bushels of wheat, at 2 dollars 14 cents per bushel? *facit* 2088,64

4 Calculate the cost of 34 yards of broad cloth, at 6 dollars 33 cents per yard. *facit* 215,22

5 What is the cost of a hogshead of molasses containing 115 gallons, at 43 cents per gallon? *answer* 49,45

6 Tell the amount of 36 cords of wood, at 6,75 per cord. *facit* 243,00

7 Find the amount of a man's wages for 296 days, at 3 dollars 43 cents per day. *facit* 1015,28

8 What is the amount of 256 pair of shoes, at 1 dollar 23 cents per pair? *answer* 314,88

9 Sold 3950*lbs.* snuff, at 29 cents per *lb.* tell the amount. *facit* 1145,50

10 Calculate the amount of 1945 barrels of flour, at 8 dollars 25 cents per barrel. *facit* 16046,25

11 Find the amount of 458 barrels of tar, at 3 dollars 50 cents. *facit* 1603,00

DIVISION.

EXAMPLES.

2)356,56	3)338,45	4)2896,44
178,28		
Dols.cts.	*Dols.cts.*	*Dols.cts.*
5)6238,44	7)3862,19	9)2384,27
Dols.cts.	*Dols.cts.*	*Dols.cts.*
Divide 6238,44 by 15	2476,23 by 25	3852,19 by 33
2384,27 by 45	3278,94 by 52	2954,76 by 56
3758,39 by 67	9645,75 by 75	5798,94 by 87

Application.

1 Divide 24 dollars 32 cents among four persons. *facit* 6,08

2 If 112*lb.* sugar cost 14 dollars, how much is that per *lb*? *answer* 12 cents 5 mills.

3 A barrel of flour weighing 196*lb.* cost 7 dollars 84 cents, what is the cost of 1*lb*? *answer* 4 cents.

4 Bought a barrel containing 125 shad for 8 dollars 50 cents, how much must I charge my neighbour for 25, at the same rate? *answer* 1,70

5 Bought a piece of broad cloth containing 34 yards for 215 dollars 22 cents, how much is that per yard? *ans.* 6,33

6 A pipe of wine containing 126 gallons cost 189 dollars, required the price of a gallon? *answer* 1,50

7 A hogshead of molasses containing 115 gallons cost 49 dollars 45 cents, how much is it per gallon? *ans.* 43 cts.

COMPOUND ADDITION.

COMPOUND addition teaches to add several sums or quantities together, of divers denominations, but of the same quality, as money, weights, measures, &c.

GENERAL RULE.

Place the numbers so, that those of the same denomination may stand directly under each other.

Then begin at the right hand column, and add up as in integers; divide the total by as many of that denomination as will make one of the next greater, set down the remainder (if any) under said column, and carry the quotient to the next, &c.

Proof. As in integers.

MONEY.

The denominations are:

4 farthings (marked *qr.*) make 1 penny, marked *d.*
12 pence - - —— 1 shilling, - - *s.*
20 shillings - - —— 1 pound, - - £.

Note. The ſhillings may be added as integers, carrying half the number of tens to the pounds, and prefixing the odd ten (if any) to the units under ſhillings.

PENCE TABLE.

d.		s.	d.
20	pence make	1	8
30	- -	2	6
40	- -	3	4
50	- -	4	2
60	- -	5	0
70	- -	5	10
80	- -	6	8
90	- -	7	6
100	- -	8	4
110	- -	9	2
120	- -	10	0
240	- -	20	0

TABLE OF SHILLINGS.

s.		£.	s.
20	shillings make	1	0
30	- -	1	10
40	- -	2	0
50	- -	2	10
60	- -	3	0
70	- -	3	10
80	- -	4	0
90	- -	4	10
100	- -	5	0
110	- -	5	10
120	- -	6	0
130	- -	6	10

EXAMPLES.

	£.	s.	d.
	487	13	8
	512	6	4
	671	11	3
	764	18	10
Total	2436	10	1

£.	s.	d.
6785	14	9
3214	5	3
7485	19	11
6471	13	6

£.	s.	d.
4761	13	5
5238	6	7
6321	11	4
3678	8	8

£.	s.	d.
376	19	6¾
623	0	5¼
496	12	7
324	6	9½

£.	s.	d.
377	12	9
622	6	3
90	7	7¼
716	11	6½

£.	s.	d.
124	11	6½
875	8	3½
612	12	4
764	9	6¾

£.	s.	d.
7416	16	10
2583	3	2
8764	12	8
1235	7	4
7589	9	5
2410	10	9
8768	18	11
4682	19	4

£.	s.	d.
4671	13	4¼
5328	6	7¾
6785	11	8½
3214	8	3½
7156	14	9¾
2843	5	2¼
7890	14	6¾
4747	19	8½

£.	s.	d.
8625	18	7½
1374	1	4½
6715	12	8¼
3284	7	3¼
6789	13	6¼
3210	6	5¾
8764	14	11½
1867	17	6

Application.

1 Suppose a merchant, on settling his accounts, finds he owes A, seventy-four pounds, seventeen shillings and six-pence; B, six hundred twenty-seven pounds, six shillings; C, eight hundred forty-seven pounds, eighteen shillings and four pence three farthings; D, 564*l*. How much does he owe in all?

	l.	*s.*	*d.*
A,	74	17	6
B,	627	6	0
C,	847	18	4¾
D,	564	0	0

2 If A have owing to him on bond 1908*l* 17*s* 10*d*.¼ and interest due thereon, 191*l* 2*s* 1*d*.½; How much is the amount? *answer* 2100*l*.

3 Suppose a vintner bought 40 tons of wine for 684*l*. loading and unloading stood him in 17*l* 13*s* 8*d*.½; storage 8*l* 10*s*. custom 16*l* 13*s* 9*d*.½; land carriage 19*l* 14*s* 6*d*.¾; How much do the cost and charges amount to? *answer* 746*l* 12*s* 0*d*.¾

4 Admit a person left his widow the use of 6436*l*. for charitable purposes 297*l* 14*s* 8*d*. gave three nephews, each 1546*l* 14*s* 8*d*. three nieces, each 1324*l*. and to his executor 304*l* 0*s* 11*d*. What is the sum of these several bequests? *answer* 15649*l* 19*s* 7*d*.

5 Suppose a man borrowed a sum of money, and paid in part at one time 13*l* 18*s* 9*d*. at another 23*l* 18*s* 4*d*.¾; at a third time 47*l* 0*s* 9*d*. and the remainder is 37*l* 14*s* 6*d*.½; what was the sum borrowed? *answer* 122*l*. 12*s* 5*d*.¼

6 Bought 3 horses for 16*l* 17*s* 4*d*. each, and two cows for 5*l* 14*s* 7*d*. each, and three bushels of wheat for 18*s* 10*d*.½; what is the amount? *answer* 63*l* 0*s* 0*d*.½

7 Admit a citizen going into the country ordered payment of the following bills, *viz*. the brewer's 42*l* 3*s* 3*d*. the butcher's 212*l* 0*s* 6*d*. the baker's 24*l*. the tallow chandler's 13*l* 8*s*. the taylor's 137*l* 9*s* 9*d*. the draper's 74*l* 13*s* 6*d*. his rent 50*l*. servants wages 46*l* 5*s*. and he would take with him 100*l*. for what sum must he draw on his banker, to defray these expences? *answer* 700*l*.

8 Suppose A owes B 109*l* 19*s* 11*d*.¾, C owes him twice as much, and D as much as them both; what is the total due to B? *answer* 659*l* 19*s* 10*d*.½

TROY

TROY WEIGHT.

By this weight, jewels, gold, silver and liquors are weighed.

The denominations are:

24 grains *(gr.)* make 1 pennyweight, marked, *dwt.*
20 pennyweights - 1 ounce, - - *oz.*
12 ounces - 1 *lb* - - - *lb.*

EXAMPLES.

lb.	*oz.*	*dwt*	*gr.*	*lb.*	*oz.*	*dwt.*	*gr.*	*lb.*	*oz.*	*dwt.*	*gr.*
7	10	11	15	21	4	13	16	33	7	10	15
2	1	8	9	78	7	6	8	165	10	4	17
4	6	7	12	36	5	10	14	43	6	12	23
5	5	12	12	63	6	9	10	276	3	13	5
9	11	13	14	78	9	18	23	53	8	9	19
6	10	19	23	67	10	19	21	327	11	19	4

Application.

1 What is the sum of 36 pounds, 7 ounces, 16 pennyweights; 48 pounds, 7 ounces, 16 grains, and 56*lb.* 6*oz.*
answer 141*lb.* 8*oz.* 16*dwt.* 16*gr.*

2 A goldsmith bought 7 ingots of silver, three of which weighed each 9*lb.* 7*oz.* 14*dwt.* and each of the rest 8*lb.* 5*oz.* 15*dwt.* 16*gr.* how much did the whole weigh?
answer 62*lb.* 10*oz.* 4*dwt.* 16*gr.*

3 Admit a goldsmith has 4 tankards weighing each 7*oz.* 18*dwt.* spoons weighing 4*lb.* 6*oz.* 3 salvers each 6*lb.* 4*oz.* what is the weight of the whole? *ans* 26*lb.* 1*oz.* 12*dwt.*

4 Suppose a silversmith sold 14 dishes weighing 18*lb* 3*oz.* 14*dwt* 36 plates weighing 48*lb.* 1*oz.* 15*dw.* 6 salts weighing 5*lb.* 7*oz.* 4 salvers, 11*lb* 10*oz.* 12*dwt.* Required the weight of the whole? *answer* 83*lb.* 11*oz.* 1*dwt.*

5 Bought three pair of sleeve buttons, each weighing 11*grs.* 2 basons weighing 1*lb.* 5*oz.* 4*dwt.* 14*gr.* and two pair of buckles each 2*oz.* 11*dwt.* how much do they weigh together? *answer* 1*lb.* 10*oz.* 7*dwt.* 23*gr.*

6 Sold several dishes weighing 11*lb.* 4*oz.* 16*dwt.* 11*gr.* plates weighing three times as much; salts 2*lb.* 5*oz.* 6*dwt.* 14*gr.* tankards 6*lb.* 7*oz.* 14*dwt.* 17*gr.* what is the weight of the whole? *answer* 54*lb.* 8*oz.* 7*dwt.* 3*gr.*

AVOIRDUPOIS-WEIGHT.

By this weight are weighed things of a coarse, drossy nature, that are bought and sold by weight; and all metals but silver and gold.

The denominations are: -

16 drams (*dr.*) make	1 ounce	*oz.*
16 ounces	1 pound	*lb.*
28 pounds	1 quarter of an *C.wt.*	*qr.*
4 quarters or 112*lbs.*	1 hundred-weight	*C.wt.*
20 hundred-weight	1 ton	*T.*

Note 1. By the above table it appears, that 112 pounds make 1 *C.wt.* which are only given in ſome particular things; and from the beſt account aſcertained at preſent, ſuch are, all ſugars (except loaf,) rice, allum, brimſtone, copperas, flour, oat-meal, cocoa, race-ginger, chalk, logwood, redwood, hay, iron, lead, madder, &c. In other articles, ſuch as meat, cheeſe, butter, &c. likewiſe in Carolina rice, five ſcore pounds are only given to the hundred.

2. Some things are bought and ſold by the dozen, groſs, &c. Hence,

12 particulars make	1 dozen.	*doz.*
12 dozen	1 common groſs,	*gro.*
12 common groſs, or 144*doz.*	1 great groſs,	*g.gro.*
20 particulars	1 ſcore	*ſco.*

EXAMPLES.

T.	*C.*	*qr.*	*lb.*
17	11	2	18
82	8	1	10
63	9	3	20
36	10	0	8
48	11	2	19
61	11	3	27

C.	*qr.*	*lb.*	*oz.*	*dr.*
21	2	17	11	10
78	1	10	4	6
67	3	21	8	9
32	0	6	7	7
48	3	27	11	15
83	1	18	15	12

C.	*qr.*	*lb.*	*oz.*	*dr.*
33	3	27	12	9
25	0	15	10	7
67	1	8	6	14
39	2	5	8	13
70	2	12	15	10
53	1	14	13	5

Application.

1 Suppose a merchant bought 3 hogsheads of sugar weighing as follow, *viz.* No. 1, nine hundred, two quarters, eighteen pounds; No. 2, 8 hundred, 3 quarters, 12 pounds; No. 3, 7 hundred, 2 quarters, 19 pounds; how much is the amount? *answer* 26*C.* 0*qr.* 21*lb.*

2 In 4 boxes of spice weighing as follows, *viz.* No. 1, one quarter, nineteen pounds, fourteen ounces, twelve drams; No. 2,

No. 2, two quarters, one pound, eleven ounces, ten drams; No. 3, 2 hundred, 2 quarters, 11 pounds, 14 ounces, 10 drams; No. 4, 3 quarters, 6 pounds, 9 ounces, 15 drams; what do they amount to? *answer* 4*C.* 1*qr.* 12*lb.* 2*oz.* 15*dr.*

3 How much is the weight of 5 casks of flour weighing as follow, *viz.* No. 1, 3*C.* 2*qr.* 18*lb.* No. 2, 2*C.* 3*qr.* 12*lb.* No. 3, 1*C.* 3*qr* 19*lb.* No 4, 3*C.* 3*qr.* 7*lb.* No. 5, 2*C.* 1*qr.* 18*lb.* *answer* 14*C.* 2*qr.* 18*lb.*

4 Bought 6 bags of hops weighing and numbered as follow, *viz.* No. 1, 2*C.* 2*qr.* No. 2, 2*C.* 1*qr.* 16*lb.* No. 3, 2*C.* 0*qr.* 3*lb.* No. 4, 2*C.* 3*qr.* No. 5, 2*C.* 1*qr.* 12*lb.* No. 6, 2*C.* 1*qr.* 16*lb.* required the amount? *answer* 14*C.* 1*qr.* 19*lb.*

5 Suppose a merchant bought 3 hogsheads of rice, one of which weighs 12*C.* 3*qr.* 17*lb.* the other two each 11*C.* 0*qr.* 14*lb.* also 3 hogsheads of tobacco, each weighing 7*C.* 3*qr.* 17*lb.* what weight has he to pay carriage for?

answer 58*C.* 3*qr.* 12*lb.*

6 What quantity of hops is there in 6 bags, the first weighing 2*qr.* 15*lb.* and each of the rest 10*lb.* more?

answer 4*C.* 1*qr.*

APOTHECARIES-WEIGHT.

By this weight apothecaries mix their medicines; but buy and sell by avoirdupois-weight.

The denominations are;

20 grains (gr.)	make	1 scruple,	℈
3 scruples	-	1 dram,	ʒ
8 drams	- -	1 ounce,	℥
12 ounces	- -	1 pound,	℔

EXAMPLES.

℔	℥	ʒ	℈	gr.
6	7	4	1	11
3	4	3	1	9
8	9	2	2	14
1	2	5	0	6
8	11	7	2	19
6	10	4	1	13

℔	℥	ʒ	℈	gr.
23	10	6	2	13
76	1	1	0	7
61	8	4	1	11
38	3	3	1	9
47	7	6	2	17
28	11	7	2	19

Application.

If a druggist mix several simples together; 1st. 3 ounces, 4 drams, 1 scruple; 2d. 4 ounces, 3 drams, 2 scruples; 3d. 4 drams, 18 grains: 4th. 6 ounces, 5 drams, 2 scruples, 18 grains; how much do they all weigh?

answer 15℥ 2ʒ 0℈ 16 gr.

LONG-MEASURE.

Long-measure is used for lengths or distances.

The denominations are;

3	barley-corns (*b.c.*) make	1 inch, - -	*in.*
12	inches - - -	1 foot, - - -	*ft.*
3	feet - - - -	1 yard, - -	*yd.*
5½	yards - - -	1 rod, pole or perch,	*P.*
40	poles (or 220*yds.*) -	1 furlong, -	*fur.*
8	furlongs (or 1760*yds.*)	1 mile, - -	*M.*
3	miles - -	1 league, -	*L.*
60 geographic or 69½ statute	miles -	1 degree - -	*deg.*

360 Degrees the circumference of the earth.

Note. A hand is the meaſure of 4 inches, and particularly applied to meaſuring the heights of horſes: and the fathom of 6 feet, to the depth of water.

EXAMPLES.

Deg.	*M.*	*fur.*	P.
4	41	3	21
5	18	4	19
6	37	2	22
3	22	5	18
8	59	7	35
4	51	6	39

Yds.	*ft.*	*in.*	*b.c.*
126	2	6	1
873	1	5	2
783	1	4	2
216	1	7	1
785	2	10	2
671	2	11	2

Application.

If from Philadelphia to the sign of the blue ball be 20 miles, 3 furlongs, 30 perches; from thence to the red lion 40 miles, 2 furlongs, 16 perches; from thence to Harris's ferry 42 miles, 3 furlongs, 9 perches; from thence to Carlisle 17 miles; and from thence to Pittsburgh 201 miles, 2 perches; how far is it from Philadelphia to Pittsburgh?

answer 321*m.* 1*fur.* 17*p.*

CLOTH-MEASURE.

By this measure cloths, tapes, &c. are measured.

The denominations are;

2¼ inches (*in.*) make	1 nail,	- -	*na.*
4 nails - -	1 quarter of a yard,		*qr.*
4 quarters -	1 yard,	- -	*yd.*
3 quarters -	1 ell Flemish,	-	*E.Fl.*
5 quarters -	1 ell English or French,		*e. E. e. Fr.*
2½ quarters or 10 nails	1 ell Hamburgh,		*E. H.*

EXAMPLES.

Yds.	*qr.*	*na.*	*E. Fl.*	*qr.*	*na.*	*E.E.*	*qr.*	*na.*
27	2	3	41	2	2	67	4	3
72	1	1	58	0	2	32	0	1
63	1	2	27	1	3	48	3	2
31	2	2	72	1	1	51	1	2
67	3	3	68	2	3	78	4	3
28	2	1	42	1	2	91	4	3

Application.

1 There are 4 pieces of linen, *viz.* No. 1, 27 yards, 2 quarters, 3 nails; No. 2, 41 yards, 3 quarters, 3 nails; No. 3, 36 yards, 1 quarter, 2 nails; No. 4, 33 yards, 2 quarters, 1 nail; what quantity do they contain?

answer 139*yds.* 2*qr.* 1*na.*

2 Suppose a draper bought 10 bales of cloth, containing as follow, *viz.* No. 1, 2, each 382 yards, 2 nails; No. 3, 4, 5, each 407 yards, 3 quarters, 2 nails; and each of the rest 223 yards, 1 quarter, 1 nail; the total is required?

facit 3104*yds.* 1*qr.* 3*na.*

LAND-

LAND-MEASURE.

This measure shews the quantity of lands.

The denominations are:

9	square feet (*Ft.*) make	1	yard,	*Yd.*
30¼	yards - -	1	perch,	*P.*
40	perches -	1	rood,	*R.*
4	roods. - -	1	acre,	*A.*

EXAMPLES.

A.	*R.*	R.	*A.*	*R.*	P.	*A.*	*R:*	P.
47	2	28	362	2	18	264	1	38
52	1	12	637	1	22	542	3	29
63	3	31	786	2	30	379	0	13
36	0	9	213	1	10	648	2	24
49	3	39	476	3	28	236	0	36
74	2	36	367	2	39	438	0	14

Application.

1 If one field contain 27 acres, 3 roods, 27 perches; another 17 acres, 3 roods, 36 perches; and a third 41 acres, 3 roods, 19 perches; how much in all?

answer 87A. 3R. 2P.

2 Admit a man has ~~one field of~~ wheat containing 37 acres, 23 ~~perches~~; another of rye 25 acres, 2 roods; two pieces of pasture each 17 acres, 1 rood, 11 perches; meadow 21 acres, 14 perches; wood land 42 acres, 2 roods, 26 perches; what quantity does he hold?

answer 161A. 0R. 5P.

LIQUID-MEASURE.

This measure is used for beer, cider, wine, &c.

The denominations are:

2	pints (*pt.*) make	1	quart, - -	*qt.*
4	quarts -	1	gallon, - -	*gal.*
63	gallons -	1	hogshead of wine or brandy,	*hhd.*
2	hogsheads -	1	pipe or butt, -	*pi.* or *bt.*
2	pipes or 4 hogsheads	1	tun, - - -	*T.*

Note. By a law of Pennſylvania, 16 gallons make one half barrel; 31½ gallons one barrel; 64 gallons one double barrel; 84 gallons 1 puncheon: 42 gallons 1 tierce.

EXAM-

EXAMPLES.

T.hhd.	*gal.*
3 2	40
6 1	23
7 3	34
2 0	29
5 3	48
4 2	62

Gal.	*qt.*	*pt.*
126	3	1
873	0	1
468	2	1
531	1	1
678	3	1
789	1	1

Gal.	*qt.*	*pt.*
879	2	0
2348	0	1
625	3	0
2338	1	1
467	2	0
3536	0	1

Application.

1 Suppose a vintner bought 4 vessels of brandy, gauging as follows, *viz.* 120 gallons, 2 quarts, 1 pint; 258 gallons; 136 gallons; 118 gallons, 1 quart; how much do they contain? *answer* 632*gal.* 3*qt.* 1*pt.*

2 Sold six hogsheads of cider, 4 of which contained each 97 gallons, 1 quart; and each of the rest 5 gallons, 2 quarts, 1 pint more; how much do they all make?

answer 594*gal.* 3*qt.*

DRY-MEASURE.

This measure is used for grain, fruit, salt, &c.

The denominations are:

2 pints (*pt.*) make 1 quart, *qt.*
8 quarts - - 1 peck, *p.*
4 pecks - - 1 bushel, *bu.*

EXAMPLES.

Bu.	*p.*	*qt.*
63	2	5
36	1	3
71	3	4
28	0	4
67	3	6
79	3	7

Bu.	*p.*	*qt.*
376	1	6
623	2	2
769	3	3
230	0	5
786	3	7
864	1	4

Bu.	*p.*	*qt.*
3764	3	4
587	0	6
753	1	1
2465	3	0
3973	2	2
48	3	5

Application.

1 Add 14 bushels, 2 pecks, 5 quarts; 23 bushels, 3 pecks; 8 bushels, 7 quarts; 19 bushels, 1 peck, to a granary

nary that contains 59 bushels, 4 quarts; and tell the amount.
answer 125 bushels.

2 Admit a man had 6 granaries, 4 of which contain 87 bushels, 2 pecks each, and the other two one hundred bushels, and seven quarts each; how much do they all contain?
answer 550*Bu.* 1*pe.* 6*qt.*

TIME.

The denominations are:

60 seconds (*sec.*) make	- - -	1 minute	*Min.*
60 minutes	- - -	1 hour	*H.*
24 hours	- - - - - -	1 day	*D.*
7 days	- - - - -	1 week	*W.*
4 weeks	- - - - -	1 month	*M.*
12 months, 1 day, and six hours, or 365 days and six hours		1 year	*Y.*

Note. A common year conſiſts of 365 days, and every fourth, called Leap-year, of 366.

The year is also divided into 12 calendar months, as follow:

The fourth, eleventh, ninth and sixth,
Have thirty days to each affix'd;
And ev'ry other thirty-one,
Except the second month alone,
Which has but twenty-eight in fine,
Till leap-year gives it twenty-nine.

EXAMPLES.

Yrs.	*Mo.*	*W.*	*Da.*
462	10	1	3
537	2	2	4
713	4	3	5
286	8	0	2
678	10	3	6
714	11	1	6

Days.	*Hr.*	*Min.*	*Sec.*
317	21	41	56
682	2	18	4
768	12	14	36
231	11	45	24
476	23	48	56
689	21	59	58

Application.

1 What day of the year was the twenty-ninth of the eighth month 1800?
answer 241st.

EXAMPLES.

T.	*hhd.*	*gal.*	*Gal.*	*qt.*	*pt.*	*Gal.*	*qt.*	*pt.*
3	2	40	126	3	1	879	2	0
6	1	23	873	0	1	2348	0	1
7	3	34	468	2	1	625	3	0
2	0	29	531	1	1	2338	1	1
5	3	48	678	3	1	467	2	0
4	2	62	789	1	1	3536	0	1

Application.

1 Suppose a vintner bought 4 vessels of brandy, gauging as follows, *viz.* 120 gallons, 2 quarts, 1 pint; 258 gallons; 136 gallons; 118 gallons, 1 quart; how much do they contain? *answer* 632*gal.* 3*qt.* 1*pt.*

2 Sold six hogsheads of cider, 4 of which contained each 97 gallons, 1 quart; and each of the rest 5 gallons, 2 quarts, 1 pint more; how much do they all make? *answer* 594*gal.* 3*qt.*

DRY-MEASURE.

This measure is used for grain, fruit, salt, &c.

The denominations are:

2 pints (*pt.*) make - 1 quart, *qt.*
8 quarts - - 1 peck, *p.*
4 pecks - - 1 bushel, *bu.*

EXAMPLES.

Bu.	*p.*	*qt.*	*Bu.*	*p.*	*qt.*	*Bu.*	*p.*	*qt.*
63	2	5	376	1	6	3764	3	4
36	1	3	623	2	2	587	0	6
71	3	4	769	3	3	753	1	1
28	0	4	230	0	5	2465	3	0
67	3	6	786	3	7	3975	2	2
79	3	7	864	1	4	48	3	5

Application.

1 Add 14 bushels, 2 pecks, 5 quarts; 23 bushels, 3 pecks; 8 bushels, 7 quarts; 19 bushels, 1 peck, to a granary

nary that contains 59 bushels, 4 quarts; and tell the amount? *answer* 125 bushels.

2 Admit a man had 6 granaries, 4 of which contain 87 bushels, 2 pecks each, and the other two one hundred bushels, and seven quarts each; how much do they all contain? *answer* 550*Bu.* 1*pe.* 6*qt.*

TIME.

The denominations are:

60	seconds (*sec.*) make	1	minute	*Min.*
60	minutes	1	hour	*H.*
24	hours	1	day	*D.*
7	days	1	week	*W.*
4	weeks	1	month	*M.*
12 365	months, 1 day, and six hours, or days and six hours	1	year	*Y.*

Note. A common year conſiſts of 365 days, and every fourth, called Leap-year, of 366.

The year is also divided into 12 calendar months, as follow:

The fourth, eleventh, ninth and sixth,
Have thirty days to each affix'd;
And ev'ry other thirty-one,
Except the second month alone,
Which has but twenty-eight in fine,
Till leap-year gives it twenty-nine.

EXAMPLES.

Yrs.	*Mo.*	*W.*	*Da.*
462	10	1	3
537	2	2	4
713	4	3	5
286	8	0	2
678	10	3	6
714	11	1	6

Days.	*Hr.*	*Min.*	*Sec.*
317	21	41	56
682	2	18	4
768	12	14	36
231	11	45	24
476	23	48	56
689	21	59	58

Application.

1 What day of the year was the twenty-ninth of the eighth month 1800? *answer* 241st.

2 From the 2d of the third month, to the 19th of the eleventh month, inclusive, how many days?

answer 263 days.

3 Admit A to be 27 years, 5 months, 2 weeks old; B 25 years; C 20 years, 7 months, 3 weeks, 4 days; D 17 years 4 days; E and F 14 years, 11 months, 1 week each; G 12 years, 1 month, 6 days; what is the sum of their ages?

answer 131*y.* 11*m.* 1*w.*

MOTION OR CIRCLE MEASURE.

This is used by astronomers, navigators, &c.

The denominations are:

60 seconds (″) make - - -	1 minute	′
60 minutes - - - -	1 degree	°
30 degrees - - -	1 sign	*sig.*

12 signs, or 360 degrees, one revolution, or circle.

EXAMPLES.

°	′	″
6	27	48
3	32	12
8	20	30
1	39	31
9	59	48
7	46	41

sig.	°	′	″
1	14	47	51
1	15	12	9
1	12	18	28
1	17	41	32
1	29	58	59
1	27	39	43

COMPOUND SUBTRACTION.

COMPOUND Subtraction teaches to take one quantity of several denominations from a greater of like quality.

GENERAL RULE.

Place the quantities as in compound addition, with the less under the greater; then begin at the right hand, and take the under from the upper; but when the lower number is greater than the upper, take it from as many of that denomination as will make one of the next greater, and to the remainder add the upper number; set down the result, and carry one to the next, &c.

Proof. As in integers.

MONEY.

EXAMPLES.

	£.	s.	d.	£.	s.	d.
From	473	14	8½	6714	18	1½
Take	164	16	4¼	1896	9	8¼
Rem.	308	18	4¼			
Proof	473	14	8½			

	£.	s.	d.	£.	s.	d.
Borrowed	670	10	0¼	4789	0	10
Paid	187	18	2	4089	17	4½

Application.

1 Suppose A is indebted to the brewer one hundred thirty-eight pounds, fourteen shillings and six pence, B 87*l* 16*s* 4*d*.½; how much does one owe more than the other?

answer 50*l* 18*s* 1*d*.½

2 The brewer and baker drew bills each upon the other; the brewer stands indebted seven hundred fifty-six pounds, seventeen shillings; the baker 437*l* 17*s* 8*d*.¾; what is the balance and in whose favour?

answer 318*l* 19*s* 3*d*.¼ in the baker's.

3 Suppose A owes 2000*l*., whereof he pays at one time 499*l* 19*s* 11*d*.½, and at a second payment 1388*l* 18*s* 11*d*. what is the residue?
answer 111*l* 1*s* 1*d*.¼

4 Admit A have owing to him on bond 792*l* 11*s* 2*d*.½, and interest due thereon 193*l* 12*s* 9*d*.¾, and receives in part pay, *viz*. 198*l* 17*s* 4*d*.½, 279*l* 11*s* 7*d*.¾, 198*l* 19*s* 10*d*.¼, and 98*l* 12*s* 9*d*.¾; what sum remains unpaid?

answer 210*l* 2*s* 4*d*.

5 Paid A B for C D's bill of 75*l.* *viz.* gave him R. Drawer's note for 7*l* 12*s* 6*d.* P. Johnson's ditto for 5*l.* an assignment on R. Dealer for 17*l* 13*s* 9*d.*½, in bank notes 40*l.* how much cash will make up the deficiency?

answer 4*l* 13*s* 8*d.*½

6 A and B have each a sum of money, A's sum, which is the greatest, is 74*l* 17*s.* and the difference is 49*l* 13*s* 6*d.* what money had B? *answer* 25*l* 3*s* 6*d.*

7 A person left 25111*l* 10*s* 6*d.* between his son and daughter; the daughter was to have eleven thousand, eleven hundred and eleven pounds 11*s* 11*d.* what was the son's legacy? *answer* 12999*l* 18*s* 7*d.*

8 A trader failing, was indebted to A 71*l* 12*s* 6*d.* to B 34*l* 9*s* 9*d.* to C 16*l* 18*s* 8*d.* to D 44*l.* to E 66*l* 7*s* 6*d.* to F 11*l* 2*s* 3*d.* to G 19*l* 19*s.* to H 20*l.* At the time, he had by him in cash 3*l.* 13*s* 6*d.* in commodities 23*l* 10*s.* in household furniture 21*l* 6*s* 11*d.* in a tenement 56*l* 15*s.* in recoverable book debts 87*l* 13*s* 10*d.* Now, supposing these effects all surrendered to his creditors; what will they lose by him? *answer* 91*l* 10*s* 5*d.*

TROY WEIGHT.

EXAMPLES.

	lb.	*oz.*	*dwt*	*gr.*	*lb.*	*oz.*	*dwt*	*gr.*
From	27	0	11	10	48	10	6	17
Take	9	8	1	18	[illegible]9	9	19	21
Rem.	17	4	9	16				
Proof	27	0	11	10				

Application.

1 From 637*lb.* 9*oz.* 8*gr.* taking 288*lb.* 10*oz.* 9*dwt.* 20*gr.* what remains? *answer* 348*lb.* 10*oz.* 10*dwt.* 12*gr.*

2 Bought 3 ingots of silver, weighing 204*lb.* 6*oz.* 10*dwt.* sold two of them, weighing 108*lb.* 6*oz.* 11*dwt.* 13*gr.* the weight of the other is required?

facit 95*lb.* 11*oz.* 18*dwt* 11*gr.*

AVOIRDUPOIS-WEIGHT.

EXAMPLES.

T.	C.	qr.	lb.
43	16	2	21
19	18	1	27

T.	C.	qr.	lb.
52	12	3	15
24	14	2	26

C.	qr.	lb.	oz.	dr.
17	1	12	14	15
6	3	21	15	9

Application.

1 Bought 45*C.* 1*qr.* 7*lb.* of sugar; and sold 39*C.* 20*lb.* what remains? *answer* 6*C.* 15*lb.*

2 From 17*T.* 7*C.* 2*qr.* taking 12*C.* 3*qr.* 9*lb.* what remains? *answer* 16*T.* 14*C.* 2*qr.* 19*lb.*

3 Bought 6 casks of flour, each weighing, 1*C.* 3*qr.* 12*lb.* tare per barrel 17*lb.* how much neat weight?

answer 10*C.* 26*lb.*

4 Sold 4 hogsheads of sugar, two of which weighed 37*C.* 3*qr.* gross, tare 3*qr.* 17*lb.* the other two each 13*C.* 2*qr.* 4*lb.* tare 1*qr.* 10*lb.* each; the neat weight is required?

facit 63*C.* 27*lb.*

APOTHECARIES-WEIGHT.

EXAMPLES.

℔	℥	ʒ	℈	gr.
9	1	3	2	12
6	10	1	1	19

℔	℥	ʒ	℈	gr.
28	10	4	1	10
17	6	7	2	8

Application.

1 From 3℔ 3℥ 1ʒ 1℈ 12gr. taking 1℔ 7℥ 0ʒ 2℈ 18gr. what is left? *answer* 1℔ 8℥ 0ʒ 1℈ 14gr.

2 If out of 17℔ 11℥ 6ʒ 2℈ of medicine, be taken 3 parcels, each 3℔ 5℥ 4ʒ 1℈ 17gr what quantity is left?

answer 7℔ 7℥ 0ʒ 2℈ 9gr.

LONG-of which were sold to D 197*gal.* 1*pt.*; to E three times as much, 10*gal.* 3*qt.* Query the remainder?

facit 263*gal.* 2*qt.*

DRY-MEASURE.

EXAMPLES.

Bu.	P.	*qt.*
28	1	6
9	3	1

Bu.	P.	*qt.*
341	3	6
298	1	2

Bu.	P.	*qt.*
471	3	4
198	2	7

Application.

1 From 27*bu.* 1P. take 18*bu.* 2P. 1*pt.*

facit 8*bu.* 2P. 7*qt.* 1*pt.*

2 What is the difference between 1000*bu.* 7*qt.* and 734*bu.* 1P. 5*qt.* *answer* 265*bu.* 3P. 2*qt.*

3 Out of a granary containing 500*bu.* taking 375*bu.* 2P. 6*qt.* what quantity must remain? *answer* 124*bu.* 1P. 2*qt.*

TIME.

EXAMPLES.

Y.	*M.*	*W.*	*D.*
1797	5	1	3
987	12	3	6

D.	*H.*	*Min.*	*sec.*
364	23	59	58
198	23	59	59

Application.

1 From 200 years, take 98*y.* 3*m.* 8*h.* 10*sec.*

facit 101*y.* 9*m.* 3*w.* 6*d.* 15*h.* 59*m.* 50*sec.*

2 An indented servant had six years to serve: and when he had continued 5*y.* 8*m.* 3*w.* 4*d.* query the remainder of his time?

facit 4*m.* 3*d.*

3 Jacob by contract was to serve Laban for his two daughters 14 years; and when he had accompliſhed 11*y.* 1[illegible]*m.* [illegible]*w.* 11*d.* the remaining time is required?

facit 1*y.* 11*lun.m.* 3*w.* 3*d.*

[illegible] The interval of time, according to the calendar, between two [illegible] may be uſefully and eaſily obtained, thus: Subtract the prior date from the latter; borrowing as many days as make the month in the ſubtrahend, and mentally adding 12 to that of the minuend, when neceſſary; carrying one, in either caſe, to the next name as uſual.

2. When one of the dates is in the o'd ſtile, and the other in the new, eleven days muſt be taken from the difference.

4 How much older is Jesse than Anna, his birth being on the 20th of the 12th month, 1778, and her's the 10th of the 8th month, 1783?

	Y.	*m.*	*d.*
	1783	8	10
	1778	12	20
answer	4	7	21

5 A was born the 21st day of the 2d month, 1765; B the 9th of the 4th month, 1771; what is the difference of their ages? *answer 6y. 1m. 16d.*

6 A bond was given the 22d of the second month, 1807, and taken up the 12th of the tenth month, 1809; for what time must interest be computed thereon?

answer 2y. 7m. 18d.

7 A was born the 26th day of the second month, 1795; B, on the 21st of the ninth month, 1797; C, on the 25th of the twelfth month, 1798; what is the difference of the ages of A and B; of B and C; also of A and C; and when will they respectively be 21 years of age?

		Y.	*m.*	*d.*	
difference	A & B	2	6	23	A on the 26th of the 2d month, 1816.
	B & C	1	3	4	B on the 21ſt of the 9th month, 1818.
	A & C	3	9	27	C on the 25th of the [illegible]th month 1819.

8 A was born on the 13th day of the sixth month, 1746, old stile; B on the 16th of the sixth month, 1764, new stile; what difference is there in their ages, and how old was each man on the 1st day of the year, 1790?

answer	Difference	17*y.*	11*m.*	22*d.*
	A's age	43*y.*	6*m.*	7*d.*
	B's age	25*y.*	6*m.*	15*d.*

MOTION.

MOTION.

EXAMPLES.

°	′	″		*ſig.*	°	′	″		*ſig.*	°	′	″
10	41	52		10	18	49	12		11	16	50	14
6	48	19		6	20	21	46		9	17	32	48

Application.

1 From 7*ſig.* 21° 17′ 51″ take 3*ſig.* 12° 51′ 57″.

facit 4*ſig.* 8° 25′ 54″

2 When a planet has moved through 9*ſig.* 9° 9′ 9″ of its orbit, how much is it short of a complete revolution?

anſwer 2*ſig.* 20° 50′ 51″.

COMPOUND MULTIPLICATION.

COMPOUND Multiplication teaches to multiply numbers or quantities consisting of divers denominations: also, to find the amount of any quantity at the given price of an integer.

GENERAL RULE.

Place the Multiplier under the lowest denomination of the given quantity; then multiply it as in integers, and divide the product by as many of this denomination as will make one of the next greater; set down the remainder (if any) underneath, and add the quotient to the product of the next denomination, and so proceed.

Note. In multiplying money, the learner may be taught to perform it without uſing diviſion. by having the pence table perfectly committed to memory, and multiplying the ſhillings as integers, carrying half the number of tens to the product of pounds, and prefixing the odd ten (if any, to the units place under ſhillings.

PROOF.

Multiply double the compound quantity or price by half the multiplying integers; or half the former by double the latter; or invert the multipliers when more than one.

EXAM-

EXAMPLES.

£.	s.	d.
24	16	4
		2
49	12	8

£.	s.	d.
12	8	2
		4

£.	s.	d.
987	18	11½
		6

£.	s.	d.
493	19	5¾
		12

℔.	oz.	dwt.	gr.
9	10	17	21
			2

T.	C.	qr.	lb.	oz.	dr.
6	17	3	21	14	15
					3

℔	℥	ʒ	℈	gr.
3	11	7	2	13
				4

Deg.	M.	fur.	p.
6	54	7	36
			5

Yds.	ft.	in.	b.c.
187	2	7	2
			6

Yds.	qr.	na.
48	3	2
		7

E.F.	qr.	na.
34	1	3
		8

E.E.	qr.	na.
68	4	1
		9

A.	R.	P.
78	3	36
		10

T.	hhd.	gal.	qt.	pt.
4	3	57	3	1
				11

Bu.	p.	qt.
38	3	7
		12

Y.	m.	w.	d.
476	10	2	6
			12

D.	h.	m.	sec.
36	21	48	56
			6

sig.	°	′	″
1	24	48	55
			4

sig.	°	′	″
10	27	30	42
			3

CASE I.

When the given quantity does not exceed 12;

RULE.

Multiply the price of an integer by said quantity, and the product will be the answer.

EXAMPLES.

		s.	d.			s.	d.
1	4 yards at	3	6			3	6
			4				2
		14	0		Double price	7	0
					Half multiplier		2
					Proof	14	0

		£.	s.	d.		£.	s.	d.
2	5 at	0	7	6	[illegible]	1	17	6
	10 at	0	3	9				
3	6 at	1	18	6		11	11	0
	12 at	0	19	3				
4	3 at	0	2	10½			8	7½
	9 at	0	0	11½				
5	11 at	2	14	8¾		30	2	0¼
6	4 at	0	9	11¼		1	19	9
	12 at	0	3	3¾				

CASE 2.

When the given quantity exceeds 12, and is the exact product of some two factors in the multiplication table;

RULE.

Multiply the given price of an integer by one of said factors, and the product of that by the other; the last product will be the answer.

EXAMPLES.

		£.	s.	d.			£.	s.	d.
1	14 yards at	0	17	6			0	17	6
					2×7=14				7
		1	15	0			6	2	6
				7					2
		12	5	0		Proof	12	5	0

		£.	s.	d.		£.	s.	d.
2	16 at	0	7	10	facit	6	5	4
	32 at	0	3	11				
3	27 at	1	2	10½		30	17	7½
	54 at	0	11	5¼				
4	50 at	0	17	11½		44	17	11
	100 at	0	8	11¾				
5	66 at	7	9	6		493	7	0
	132 at	3	14	9				
6	72 at	9	18	11½		716	5	0
	144 at	4	19	5¾				

CASE 3.

When the given quantity is not the exact product of any two factors in the multiplication table;

RULE.

Use two such factors as will produce the nearest to the given quantity, and add or subtract for the deficiency or excess.

EXAMPLES.

			s.	d.				s.	d.
1	19lb. at		3	8×1				3	8×1
				3×6+1=19					6
			11	0			1	2	0
				6					3
		3	6	0			3	6	0
			3	8				3	8
	facit	3	9	8		Proof	3	9	8

		£.	s.	d.		£.	s.	d.
2	43 at	0	17	8	facit	37	19	8
	86 at	0	8	10				
3	58 at	0	0	9½		2	5	11
	116 at	0	0	4¾				
4	74 at	0	12	8		46	17	4
	148 at	0	6	4				

		£.	s.	d.		£.	s.	d.
5	76 at	0	15	11½	facit	60	12	10
	152 at	0	7	11¾				
6	78 at	8	7	0		651	6	0
	156 at	4	3	6				

CASE 4.

When the given quantity is greater than the product of any two factors in the table;

RULE.

Multiply continually by as many tens less one, as there are figures in the given quantity; then multiply the last product by the figure in the left of the said quantity (if more than one;) again multiply the figure in the units place into the given price, and that in the tens place into the price of ten, &c. place the several products as in addition, and their sum will be the answer.

EXAMPLES.

d.
1 176*lb.* at 6½×6
10

5 5×7
10

2 14 2
1 17 11
3 3

facit 4 15 4

d.
Multiply 3¼
by 352 4×8×11=352

1 1
8

8 8
11

facit 4 15 4

		£.	s.	d.		£.	s.	d.
2	195 at	0	1	2	*facit*	11	7	6
	390 at	0	0	7				
3	407 at	0	3	3		66	2	9
	814 at	0	1	7½				
4	875 at	0	14	3		623	8	9
	1750 at	0	7	1½				
5	3540 at	2	5	0		7965	0	0
	7980 at	1	2	6				
6	286573 at	4	3	9		1200024	8	9

Application.

			£.	s.	d.
1	9*C.wt.* at 1*l* 11*s* 5*d.* per *C.*	*facit*	14	2	9
2	12 gallons, at 9*s* 6*d.* per gallon.		5	14	0
3	42 yards, at 34*s* 6*d.* per yard.		72	9	0
4	99 yards, at 18*s* 11*d.*½		93	16	10½
5	144 reams, at 13*s* 4*d.* per ream.		96	0	0
6	59 yards, at 7*s* 10*d.* per yard.		23	2	2
7	117*C.wt.* at 1*l* 2*s* 3*d.* per *C*		130	3	3
8	198 bushels, at 6*s* 8*d.* per bushel.		66	0	0
9	275 cords, at 22*s* 6*d.* per cord.		309	7	6
10	336 yards, at 2*s* 5*d.* per yard.		40	12	0
11	350 ounces, at 11*d.*¾ per ounce.		17	2	8½
12	739 tons, at 3*l* 8*s* 11*d.*¼ per ton.		2547	4	9¾

13 Bought a piece of cloth containing 24*yds.* at 15*s* 3*d.* per yard; what comes it to? *answer* 18*l* 6*s.*

14 What cost a chest of tea, weighing 98*lb.* at 5*s* 6*d.* per *lb*? *answer* 26*l* 19*s.*

15 What is the value of 672*lb.* of sugar, at 7*d.*½ per *lb*? *answer* 21*l.*

16 If 240 acres of land be let at 14*s* 6*d.* per acre; what is the yearly rent? *answer* 174*l.*

17 If a person expend 32*s* 6*d.* per day, and at the year's end lay up 294*l* 12*s* 6*d.* what is his yearly income? *answer* 887*l* 15*s.*

18 Sold 1344*lb.* of tobacco, at 18*d.* per *lb.* what is its value? *answer* 100*l* 16*s.*

19 If a man's income be 7*s* 6*d.* per day, how much is that in a year? *answer* 136*l* 17*s* 6*d.*

20 What does a labourer earn in a year, at 2*s* 6*d.* per day, working 6 days in each week? *answer* 39*l* 2*s* 6*d.*

21 If a merchant have owing to him 1000*l.* and his debtor agrees to pay him 12*s* 6*d.* in the pound; what sum must the merchant receive? *answer* 625*l.*

22 Suppose a person's annual income be 500*l.* and he expend daily 19*s* 11*d.* what does he lay up at the year's end? *answer* 136*l* 10*s* 5*d.*

23 A grocer bought 6 casks of sugar, each containing 504*lb.* at 8*d.*¾ per *lb.* which he disposed of at 9*d.*½; what was the gain of that purchase and sale? *answer* 9*l* 9*s.*

24 A merchant bought 20 pieces of linen, each containing 25 yards, at 2*s* 7*d*.½ per yard; which he sold at 2*s* 10*d*.½ per yard; required the prime cost, what it sold for, and what was gained?

		£.	*s*.	*d*.
answer	Prime cost	65	12	6
	Sold for	71	17	6
	Gained	6	5	0

COMPOUND DIVISION.

THIS Rule is the reverse of compound multiplication, and teaches to divide several numbers of divers denominations; also to find the price of an integer when the quantity and its value are given.

GENERAL RULE.

Divide the first denomination on the left; multiply the remainder, if any, by the numbers of the second denomination in a unit of the first; and add the second to the product; divide the sum as before, &c.

Note. In diviſion of money, call each pound remaining two tens, and if there be ten in the ſhillings, add one, and continue the proceſs.

PROOF.

By compound multiplication.

EXAMPLES.

£. *s*. *d*.
2)743 17 4

Quotient 371 18 8
2

Proof 743 17 4

£. *s*. *d*.
4)147 14 8

£. *s*. *d*.
3)9866 19 11¾

£. *s*. *d*.
4)7685 13 8¾

£. *s*. *d*.
5)9759 16 7½

lb. oz. dwt gr. 5)41 12 17 22	*T. C. qr. lb.* 6)91 16 2 24	℔ ℥ ʒ ℈ gr. 7)9 10 6 1 18
Deg. M. fur. p. 8)41 48 7 36	*Yds. ft in. b.c.* 9)18 2 7 2	*Yds. qr. na.* 10)67 3 2
A. R. p. 11)1786 3 33	*T. hhd gal. qt.* 12)27 3 24 2	*Bu. p. qt.* 12)476 3 6
Y. m. w. d. 6)1797 11 3 6	*D. h. m. sec.* 7)12 5 11 35	*sig.* ° ′ ″ 8)11 20 48 56

CASE 1.

When the dividing number does not exceed 12.

RULE.

Divide the value by said number, the quotient will be the answer.

EXAMPLES.

1 Divide 4*s* 6*d.*¾ by 3

s. *d.*
3)4 6¾
facit 1 6¼

s. *d.*
1 6¼
3
4 6¾ Proof.

	£.	s.	d.				£.	s.	d.
2 Divide	1	8	4	by	5	*facit*	0	5	8
3	3	19	9¼	by	7		0	11	4¼
4	4	8	6	by	9		0	9	10
5	3	15	0	by	10		0	7	6

6 Divide

	£.	s.	d.			£.	s.	d.
6 Divide	9	17	9¼	by 11	*facit*	0	17	11¾
7	11	11	3	by 6		1	18	6½
8	23	2	6	by 12				

CASE 2.

When the dividing number is the exact product of some two factors in the multiplication table;

RULE.

Divide by one of ſaid factors, and the quotient by the other.

Note. With reſpect to remainders ſee note 2 in ſhort diviſion.

EXAMPLES.

1 Divide 173*l* 14*s* 7*d*. by 16

£. s. d.
4)173 14 7
4)43 8 7¾
facit 10 17 1¾ + 3 rem.

£. s. d.
10 17 1¾ 3 rem.
4
43 8 7¾
4
173 14 7 Proof.

	£.	s.	d.				£.	s.	d.
2 Divide	3	10	10½	by	27	*facit*	0	2	7½
3	52	10	0	by	56		0	18	9
4	372	16	0	by	96		3	17	8
5	225	0	0	by	120		1	17	6
6	474	0	0	by	72		6	11	8
7	948	0	0	by	144				

CASE 3.

When the dividing number is not the exact product of any two factors in the table;

RULE.

Divide the greateſt denomination by ſaid number, as in long diviſion; multiply the remainder, if any, by as many of the next denomination as make one of that, adding in the number of the next name; divide the product as before, &c.

EXAMPLES.

EXAMPLES.

```
                £.  s.  d.
1 Divide        36  16  3 by 19
                          l.  s.  d.
             19)36  16  3(1  18  9 facit
                19               3×6+1=19
                --        ----------
                17          5  16  3
                 20                6
                ---       ----------
             19)356        34  17  6
                 19         1  18  9
                ---       ----------
                166        36  16  3 Proof.
                152       ----------
                ---
                 14
                 12
                ---
             19)171
                171
                ---
```

	£.	s.	d.				£.	s.	d.
2 Divide	6	6	8	by	38	*facit*	0	3	4
3	46	17	4	by	74		0	12	8
4	189	14	0	by	95		1	19	11+
5	310	12	0½	by	106		2	18	7¼
6	3236	12	4½	by	654		4	18	11¾

Application.

1 Bought 4 bushels of salt for 17*s* 6*d.* what was it per bushel ?, *answer* 4*s* 4*d.*½

2 Sold 8 yards of linen for 3*l* 11*s* 8*d.* what was the price per yard ? *answer* 8*s* 11*d.*½

3 A labourer had 3*l* 3*s.* for twelve days service ; what was that per day ? *answer* 5*s* 3*d.*

4 If 24 yards of cloth cost 18*l* 6*s.* the price of one yard is required ? *answer* 15*s* 3*d.*

5 What is wheat per bushel, when 42 bushels are sold for 17*l* 13*s* 6*d.* *answer* 8*s* 5*d.*

6 When 100 gallons of wine are sold for 83*l* 6*s* 8*d* what is a gallon worth? *answer* 16*s* 8*d*.

7 If 58*lb.* of sugar be sold for 2*l* 5*s* 11*d.* what is that per *lb*? *answer* 9*d.*½

8 Bought 230 bushels of salt for 26*l* 16*s* 8*d.* what was it per bushel? *answer* 2*s* 4*d.*

9 If 814*lb* of double refined sugar cost 66*l* 2*s* 9*d.* what was it by the *lb*? *answer* 1*s* 7*d.*½

10 If the expence of a public building, amounting to 7965*l.* be discharged equally by 3540 persons; what is each man's quota? *answer* 2*l* 5*s.*

11 Bought 5 pieces of cloth, each containing 20 yards, for 94*l* 3*s* 4*d.* what was it per yard? *answer* 18*s* 10*d.*

12 Sold 144 bushels of wheat for 57*l.* what was the price of one bushel, at that rate? *answer* 7*s* 11*d.*

13 If 400*lb.* of sugar cost 14*l* 3*s* 4*d.* what was it by the *lb*? *answer* 8*d.*½

14 Suppose a man left to three persons, viz. to A ¼ of 173*l* 13*s* 9*d.* to B ½ of 147*l* 11*s* 4*d.* and to C ¾ of 128*l* 9*s* 11*d.* how much is each man's share, and the whole sum left?

	£.	*s.*	*d.*	
answer	43	8	5¼	A;
	73	15	8	B;
	96	7	5¼	C;
	213	11	6½	Sum left.

15 A man left 1000*l.* to his wife and three sons; to his wife ⅓, to his eldest son ¼, and the remainder to be equally divided betwixt the other two; what is each one's legacy?

	£.	*s.*	*d.*	
answer	333	6	8	Wife;
	250	0	0	eldest Son;
	208	6	8	others each.

16 Divide 1685*l* 18*s* 6*d.* thus; give A ½, B ⅓, and C the rest; what is each man's share?

	£.	*s.*	*d.*	
answer	842	19	3	A's share;
	561	19	6	B's
	280	19	9	C's

REDUCTION.

REDUCTION is the reducing of a given sum, or quantity, to a different denomination, retaining the same value.

RULE.

When {descending to a lower name, multiply / ascending to a higher name, divide} by that number of the lower, which makes a unit of the higher.

Note 1. When the given quantity is compound, its lower names are to be ſeverally taken in with their like denominations in the proceſs.

2. Remainders are ſynonymous with their dividends.

Proof. Reverse the question.

MONEY.

Far.		*Pen.*		*Shil.*		*Poun.*
4	=	1	=	$\frac{1}{12}$	=	$\frac{1}{240}$
48	=	12	=	1	=	$\frac{1}{20}$
960	=	240	=	20	=	1

Note.
To reduce

Dollars	*To Pounds,*	× 3 ÷ 8
French Pistoles	*Pennsylvania,*	× 11 ÷ 8
Spanish Pistoles	*New Jersey,*	× 7 ÷ 5
English Guineas	*Delaware,*	× 7 ÷ 4
Moidores	*Maryland,*	× 9 ÷ 4
Doubloons	*currency.*	× 5 + $\frac{1}{8}$ *pro.*

and the contrary.

To reduce Dollars to Crowns, deduct $\frac{1}{11}$, and Crowns to Dollars, add $\frac{1}{10}$.

FEDERAL MONEY.

Mills.		*Cents.*		*Dimes.*		*Dol.*		*Eagles.*
10	=	1	=	$\frac{1}{10}$	=	$\frac{1}{100}$	=	$\frac{1}{1000}$
100	=	10	=	1	=	$\frac{1}{10}$	=	$\frac{1}{100}$
1000	=	100	=	10	=	1	=	$\frac{1}{10}$
10000	=	1000	=	100	=	10	=	1

EXAMPLES.

1 How many cents are equivalent to 7 Eagles.

7 *Eagles.*
10
70 *Dollars.*
10
700 *Dimes.*
10
answer 7000 *Cents.*

or thus:

7 *Eagles.*
1000
7000 *Cents.*

1|000)7|000
Proof 7 *Eagles.*

Note: { *Cents*, by deducting one tenth of their number, are reduced to *Pence*.
Pence, by adding one ninth thereof, make *Cents*.

2 Reduce 50 cents or hundredths of a dollar to pence, or ninetieths, and these pence back again to cents.

50 *Cents.*
$\frac{1}{10} = 5$ Subt.

facit 45 *pence.*
$\frac{1}{9} = 5$ Add.

Proof 50 *Cents.*

3 In 85 cents how many pence? *answer* 76½*d.*

4 Reduce 365*l.* to pence.

£.
365
20

7300
12

facit 87600

d.
12)87600

2|0)730|0

Proof 365

5 How many cents are equal to 73 pence? *answer* 81
6 In 742 dollars, how many mills? *answer* 742000*m.*
7 Reduce 75460 mills to dollars. *facit* 75*D.* 46*ct.*
8 Try how many dimes are in a dozen doubloons.
facit 1791*d.* 6*m.*

9 Convert 100 pounds sterling into federal eagles.
facit 44*E.* 4*D.*

10 Bring 50 French guineas to cents. *facit* 23000*ct.*
11 Bring 2691*l* 13*s* 2*d* into pence. 645998*d.*
12 Reduce 87600 pence to pounds. 365*l.*
13 Reduce 322999 pence to pounds. 1345*l* 16*s* 7*d.*
14 In 916*l* 10*s* 9*d.*¾ how many *qrs.* *answer* 879879*qrs.*
15 In 77*l* 14*s* 7*d.*½, how many half-pence?
answer 37311 half-pence.

16 In 879879 *qrs.* how many pounds? 916*l* 10*s* 9*d.*¾
17 In 37311 half-pence, how many pounds?
answer 77*l* 14*s* 7*d.*½

18 Reduce 1678 dollars to six-pences.
facit 25170 six-pences.

19 In 728 dollars, how many pence and farthings?
answer 65520*d.* 262080*qr.*

20 In 262080 farthings, how many dollars and pounds?
answer 728 dollars, 273*l.*

21 In 85 English guineas, how many dollars? *ans.* 396,27

22 Reduce 450 moidores to dollars. *facit* 2700

23 Reduce 137*l* 15*s* 6*d.*$\frac{3}{4}$ into farthings, and these again to pounds. *facit* 132267 *qrs.*

24 Bring 275*l* 11*s* 1*d.*$\frac{1}{2}$ to half-pence, and these back to pounds. *facit* 132267 half-pence.

25 In 630 pistareens, how many dollars. *answer* 126.

26 In 728 dollars, how many pounds Pennsylvania currency? *answer* 273*l.*

27 Reduce 546*l.* Pennsylvania currency to dollars.
facit 1456 dollars.

28 How many pounds Pennsylvania currency are equal to 537 dollars? *answer* 201*l* 7*s* 6*d.*

29 If 402*l* 15*s.* Pennsylvania currency be exchanged for dollars, what number is equivalent? *answer* 1074 dollars.

30 How many French crowns are equal to 697*l* 2*s* 6*d.* Pennsylvania currency? *answer* 1690 crowns.

31 In 845 French crowns, how many pounds Pennsylvania currency? *answer* 348*l* 11*s* 3*d.*

32 What number of French crowns are equal to 891 dollars? *answer* 810 crowns.

33 How many dollars are equal to 1620 French crowns?
answer 1782 dollars.

34 In 678 English guineas, how many pounds sterling; also, how much in Pennsylvania currency?
answer 711*l* 18*s.* sterling; 1186*l* 10*s.* currency.

35 How many crowns of 5*s.* each, half crowns, and shillings, are in 279*l* 13*s.* and the number of each to be equal? *answer* 658

36 Reduce 461*l.* New York or North Carolina currency, to dollars. *answer* 1152dols. 50*ct.*

37 Bring 1685 dols. into North Carolina or New York currency. *facit* 674*l.*

38 In 112*l.* Georgia or South Carolina currency, how many dollars? *answer* 480

39 Bring 1620 dollars into South Carolina or Georgia currency. *facit* 378*l.*

40 How many dollars are in 138*l.* Virginia or New England currency? *answer* 460

41 Bring 436 dollars into Virginia or New England currency. *facit* 130*l* 16*s.*

42 Change 25*l.* sterling into dollars. *facit* 111

43 In 2664 dollars, how many pounds sterling? 600

44 In 185 dollars how many livres tournois? 1000

45 Bring 3550 livres into dollars. *facit* 656,75

46 Reduce 780 dollars to guilders of Holland. *facit* 2000

47 Bring 3475 guilders into dollars. *facit* 1355,25

48 How many dollars are equal to 246 French pistoles? *answer* 902

49 Reduce 500 Spanish pistoles into pounds Pennsylvania currency. *facit* 700*l.*

50 In 180 English guineas, how many pounds Pennsylvania currency? *answer* 315*l.*

51 What sum, in Pennsylvania currency, is equal to 350 moidores? *answer* 787*l* 10*s.*

52 In a purse of 120 doubloons, how many pounds sterling? Also, how much in Pennsylvania currency? *answer* 396*l.* sterling, 675*l* currency.

53 How many English guineas are equal in value to 1240 moid[illegible]? And what is their sum in Pennsylvania currency? *answer* 1594 guineas and 6*s.* ster. 2790*l.* currency.

54 What do 1320 marks, at 13*s* 4*d.* each, amount to? *answer* 880*l.*

TROY WEIGHT.

Gra.		*Pen.*		*Oun.*		*Poun.*
24	=	1	=	$\frac{1}{20}$	=	$\frac{1}{240}$
480	=	20	=	1	=	$\frac{1}{12}$
5760	=	240	=	12	=	1

EXAMPLES.

1 How many ounces, pennyweights and grains are in 37*lb.* *answer* 444*oz.* 8880*dwt.* 213120*gr.*

2 Reduce 213120 grains to pounds. *facit* 37*lb.*

3 In 59*lb.* 13*dwt.* 5*gr.* how many grains? *answer* 340157*gr.*

4 In 4 ingots of silver, each weighing 4*lb.* 7*oz.* 2*dwt.* how many grains? *answer* 105792*gr.*

5 In 9*lb.* 7*oz.* 10*d.* of silver, how many spoons, each 5*oz.* 10*dwt.* *answer* 21 spoons.

6 How many lockets, each to weigh half an ounce, will 4560 grains of gold make? *answer* 19 lockets.

7 In 1 dozen salvers, each 2*lb.* 1*oz.* 15*dwt.* and 1 dozen tankards, each 1*lb.* 3*oz.* 15*dwt.* 22*gr.* what is their weight? *answer* 41*lb.* 6*oz.* 11*dwt.*

8 How many porringers, each to weigh 11*oz.* will 19*lb.* 3*oz.* of silver make? *answer* 21 porringers.

AVOIRDUPOIS-WEIGHT.

Drams.		*Ounces.*		*Pounds.*		*Qua.*		*Hund.*		*Tons.*
16	=	1	=	$\frac{1}{16}$	=	$\frac{1}{448}$	=	$\frac{1}{1792}$	=	$\frac{1}{35840}$
256	=	16	=	1	=	$\frac{1}{28}$	=	$\frac{1}{112}$	=	$\frac{1}{2240}$
7168	=	448	=	28	=	1	=	$\frac{1}{4}$	=	$\frac{1}{80}$
28672	=	1792	=	112	=	4	=	1	=	$\frac{1}{20}$
573440	=	35840	=	2240	=	80	=	20	=	1

EXAMPLES.

1 In 15 tons, how many hundred weight, quarters and pounds? *answer* 300*C.wt.* 1200*qr.* 33600*lb.*

2 Reduce 67200*lb.* to tons. *facit* 30 tons.

3 In 9*C.* 5*lb.* how many ounces? *answer* 16208 *oz.*

4 Reduce 20571005 drams to tons.
facit 35*T.* 17*C.* 1*qr.* 23*lb.* 7*oz.* 13*dr.*

5 In 6 casks of flour, each 2*C.* 2*qr.* 11*lb.* how many pounds? *answer* 1746*lb.*

6 In 235 parcels of sugar, each [illegible] hundred weight? *answer* 109*C.* [illegible]

7 In 17*C.* 1*qr.* 6[illegible] how many parcels, each 34*lb.*
answer 57 parcels.

8 If twelve casks of flour of equal weight contain 3492*lb.* the weight of one cask is required? *answer* 2*C.* 2*qr.* 11*lb.*

APOTHECARIES-WEIGHT.

Grai.		*Scru.*		*Dr.*		*Oz.*		*Pounds,*
20	=	1	=	$\frac{1}{3}$	=	$\frac{1}{24}$	=	$\frac{1}{288}$
60	=	3	=	1	=	$\frac{1}{8}$	=	$\frac{1}{96}$
480	=	24	=	8	=	1	=	$\frac{1}{12}$
5760	=	288	=	96	=	12	=	1

EXAMPLES.

1 In 17*lb.* how many ounces, drams and scruples? *answer* 204℥, 1632ʒ, 4896℈

2 In 1332005 grains, how many pounds? *answer* 231℔, 3℥, 5gr.

3 In 5*lb.* of drugs, how many parcels, each 16 drams? *answer* 30 parcels.

4 In 20 parcels of drugs, each weighing 24 drams, how many pounds? *answer* 5℔

LONG-MEASURE.

Bar.Cor.	*Inches.*	*Feet.*	*Yards.*	*Poles.*	*Furlo.*	*Miles.*
3=	1=	$\frac{1}{12}$ =	$\frac{1}{36}$ =	$\frac{1}{198}$=	$\frac{1}{7920}$=	$\frac{1}{63360}$
36=	12=	1 =	$\frac{1}{3}$ =	$\frac{2}{33}$=	$\frac{1}{660}$=	$\frac{1}{5280}$
108=	36=	3 =	1 =	$\frac{2}{11}$=	$\frac{1}{220}$=	$\frac{1}{1760}$
594=	198=	$16\frac{1}{2}$=	$5\frac{1}{2}$=	1=	$\frac{1}{40}$=	$\frac{1}{320}$
23760=	7920=	660 =	220 =	40=	1=	$\frac{1}{8}$
190080=	63360=	5280 =	1760 =	320=	8=	1

EXAMPLES.

1 How many inches are in 273 miles? *ans.* 17297280*in.*

2 In 34594560 inches, how many miles? *ans.* 546*m.*

3 Reduce 2*M* 1*fur.* 8*P.* 3*yds.* 2*in.* into inches. *facit* 136334 inches.

4 Reduce 2280060 barley corns to miles. *facit* 11*M.* 7*fur.* 38*P.* 2*yds.* 2*ft.*

5 Required the number of revolutions a wheel 18*f.* 4*in.* will make in running 150 miles. *facit* 43200

6 What distance must a measuring wheel, 18*f.* 4*in.* in circumference, run to make 86400 turns? *facit* 300 miles.

7 Required the earth's circumference in yards? *facit* 44055200

CLOTH-MEASURE.

In.	*Na.*	*Qr.*	*Yd.*
$2\frac{1}{4}$ =	1 =	$\frac{1}{4}$ =	$\frac{1}{16}$
9 =	4 =	1 =	$\frac{1}{4}$
36 =	16 =	4 =	1

EXAMPLES.

1 In 15*yds.* 3*qr.* 1*na.* how many nails? *answer* 253*na.*

2 In 1012 nails of cloth, how many yards?

answer 63*yds.* 1*qr.*

3 Reduce 73 ells Flemish to quarters. *facit* 219*qrs.*

4 How many ells Flemish are in 1752 nails? *ans.* 146ells.

5 How many ells English are in 1408 nails?

answer 70*E.* 2*qrs.*

6 In 10 bales of cloth, each 10 pieces, and each piece 12 yards, how many yards? *answer* 1200 yards.

7 In 408*yds.* 3*qrs.* of cloth how many ells Flemish; also, how many ells English? *answer* 545*E.Fl.* 327*E.E.*

8 In 4 bales of cloth, each 12 pieces, and each piece 24 ells English, how many yards, and ells Flemish?

answer 1440 yards, 1920 ells Flemish.

LAND-MEASURE.

Sq. Inch.	*Sq. Feet.*	*Sq. Yd.*	*Sq. Pe.*	*Rood.*	*Acre.*
144 =	1 =	$\frac{1}{9}$ =	$\frac{1}{1089}$ =	$\frac{1}{10890}$ =	$\frac{1}{43560}$
1296 =	9 =	1 =	$\frac{1}{121}$ =	$\frac{1}{1210}$ =	$\frac{1}{4840}$
39204 =	272$\frac{1}{4}$ =	30$\frac{1}{4}$ =	1 =	$\frac{1}{40}$ =	$\frac{1}{160}$
1568160 =	10890 =	1210 =	40 =	1 =	$\frac{1}{4}$
6272640 =	43560 =	4840 =	160 =	4 =	1

EXAMPLES.

1 Reduce 27*A.* 1*R.* 32*P.* into perches. *facit* 4392 *per.*

2 Reduce 4392 perches into acres. *facit* 27*A.* 1*R.* 32*P.*

3 Suppose one field to contain 6*A.* 2*R.* 36*P.* another 10 acres, and a third 12*A.* 1*R.* which are to be divided into shares of 76 perches each; query the number?

answer 61 shares.

4 A tract of land, containing 1299600 square perches, is to be divided into 25 plantations; query the number of acres in each? *answer* 324*A.* 3*R.* 24*P.*

LIQUID-MEASURE.

Pints.	*Gal.*	*Tie.*	*Hbd.*	*Punch.*	*P. or B.*	*Tun.*
8 =	1 =	$\frac{1}{42}$ =	$\frac{1}{63}$ =	$\frac{1}{84}$ =	$\frac{1}{126}$ =	$\frac{1}{252}$
336 =	42 =	1 =	$\frac{2}{3}$ =	$\frac{1}{2}$ =	$\frac{1}{3}$ =	$\frac{1}{6}$
504 =	63 =	1$\frac{1}{2}$ =	1 =	$\frac{3}{4}$ =	$\frac{1}{2}$ =	$\frac{1}{4}$
672 =	84 =	2 =	1$\frac{1}{3}$ =	1 =	$\frac{2}{3}$ =	$\frac{1}{3}$
1008 =	126 =	3 =	2 =	1$\frac{1}{2}$ =	1 =	$\frac{1}{2}$
2010 =	252 =	6 =	4 =	3 =	2 =	1

EXAMPLES.

1 In 17*lb.* how many ounces, drams and scruples? *answer* 204℥, 1632ʒ, 4896℈

2 In 1332005 grains, how many pounds? *answer* 231℔, 3℥, 5gr.

3 In 5*lb.* of drugs, how many parcels, each 16 drams? *answer* 30 parcels.

4 In 20 parcels of drugs, each weighing 24 drams, how many pounds? *answer* 5℔

LONG-MEASURE.

Bar.Cor.	*Inches.*	*Feet.*	*Yards.*	*Poles.*	*Furlo.*	*Miles.*
3=	1=	$\frac{1}{12}$ =	$\frac{1}{36}$ =	$\frac{1}{198}$=	$\frac{1}{7920}$=	$\frac{1}{63360}$
36=	12=	1 =	$\frac{1}{3}$ =	$\frac{2}{33}$=	$\frac{1}{660}$=	$\frac{1}{5280}$
108=	36=	3 =	1 =	$\frac{2}{11}$=	$\frac{1}{220}$=	$\frac{1}{1760}$
594=	198=	16$\frac{1}{2}$=	5$\frac{1}{2}$=	1=	$\frac{1}{40}$=	$\frac{1}{320}$
23760=	7920=	660 =	220 =	40=	1=	$\frac{1}{8}$
190080=	63360=	5280 =	1760 =	320=	8=	1

EXAMPLES.

1 How many inches are in 273 miles? *ans.* 17297280*in.*

2 In 34594560 inches, how many miles? *ans.* 546*m.*

3 Reduce 2*M* 1*fur.* 8*P.* 3*yds.* 2*in.* into inches. *facit* 136334 inches.

4 Reduce 2280060 barley corns to miles. *facit* 11*M.* 7*fur.* 38*P.* 2*yds.* 2*ft.*

5 Required the number of revolutions a wheel 18*f.* 4*in.* will make in running 150 miles. *facit* 43200

6 What di[illegible] a measuring wheel, 18*f.* 4*in.* in cir[illegible]ce, run to make 864[illegible]s? *facit* 300 miles.

7 Required the earth's circumference [illegible]ards? *facit* 44035200

CLOTH-MEASURE.

In.	*Na.*	*Qr.*	*Yd.*
2$\frac{1}{4}$ =	1 =	$\frac{1}{4}$ =	$\frac{1}{16}$
9 =	4 =	1 =	$\frac{1}{4}$
36 =	16 =	4 =	1

EXAMPLES.

1 In 15*yds.* 3*qr.* 1*na.* how many nails? *answer* 253*na.*

2 In 1012 nails of cloth, how many yards?
answer 63*yds.* 1*qr.*

3 Reduce 73 ells Flemish to quarters. *facit* 219*qrs.*

4 How many ells Flemish are in 1752 nails? *ans.* 146ells.

5 How many ells English are in 1408 nails?
answer 70*E.* 2*qrs.*

6 In 10 bales of cloth, each 10 pieces, and each piece 12 yards, how many yards? *answer* 1200 yards.

7 In 408*yds.* 3*qrs.* of cloth how many ells Flemish; also, how many ells English? *answer* 545*E.Fl.* 327*E.E.*

8 In 4 bales of cloth, each 12 pieces, and each piece 24 ells English, how many yards, and ells Flemish?
answer 1440 yards, 1920 ells Flemish.

LAND-MEASURE.

Sq.Inch.	*Sq.Feet.*	*Sq.Yd.*	*Sq.Pe.*	*Rood.*	*Acre.*
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1296 =	9 =	1 =	$\frac{1}{121}$ =	$\frac{1}{1210}$ =	$\frac{1}{4840}$
39204 =	272$\frac{1}{4}$ =	30$\frac{1}{4}$ =	1 =	$\frac{1}{40}$ =	$\frac{1}{160}$
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answer 61 shares.

4 A tract of land, containing 1299600 square perches, is to be divided into 25 plantations; query the number of acres in each? *answer* 324*A.* 3*R.* 24*P.*

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672 =	84 =	2 =	1$\frac{1}{3}$ =	1 =	$\frac{2}{3}$ =	$\frac{1}{3}$
1008 =	126 =	3 =	2 =	1$\frac{1}{2}$ =	1 =	$\frac{1}{2}$
2010 =	252 =	6 =	4 =	3 =	2 =	1

EXAMPLES.

EXAMPLES.

1 In 19*hhds.* of wine, how many pints? *answer* 9576*pt.*

2 Reduce 19152 *pts.* to *hhds.* *facit* 38 *hhds.*

3 In 11 barrels of beer, how many quarts? *answer* 1386*qt.*

4 How many dozen of gallon, quart and pint bottles, each a like number, will be required to contain a cask of Madeira, whose content is 165 gallons? *answer* 10 dozen.

DRY-MEASURE.

Pt.	*Qt.*	*Pec.*	*Bu.*
2	1	$\frac{1}{8}$	$\frac{1}{32}$
8	4	$\frac{1}{2}$	$\frac{1}{8}$
16	8	1	$\frac{1}{4}$
64	32	4	1

EXAMPLES.

1 In 17 bushels 5 quarts, how many pints? *answer* 1098 pints.

2 In 5054 pints, how many bushels? *answer* 78*bu.* 3*pe.* 7*qt.*

3 In 4 granaries, each containing 65*bu.* 1*pe.* 6*qt.* how many sacks will they fill, each to hold 5*bu.* 2*pe.* *answer* 47 sacks, 3*bu.* 1*pec.* over.

TIME.

Seconds.	*minutes.*	*hours.*	*days.*	*weeks.*	*months.*
60	1	$\frac{1}{60}$	$\frac{1}{1440}$	$\frac{1}{10080}$	$\frac{1}{40320}$
3600	60	1	$\frac{1}{24}$	$\frac{1}{168}$	$\frac{1}{672}$
86400	1440	24	1	$\frac{1}{7}$	$\frac{1}{28}$
604800	10080	168	7	1	$\frac{1}{4}$
2419200	40320	672	28	4	1
31557600	525960	8766	365¼	52*w.* 1*d* 6*h.*	1*yr.*

EXAMPLES.

1 Reduce 37*w.* 5*d.* into minutes. *facit* 380160*m.*

2 Reduce 24796800 *sec.* to weeks. *facit* 41 *w.*

3 How many hours, minutes and seconds, are there in a year? *answer* 8766*h.* 525960*m.* 31557600*sec.*

4 From the creation of the world, 4004 years before Christ, to the year 1790, inclusive, how many days have passed? *answer* 2116258 *d.* 12*h.*

MOTION.

MOTION.

Seconds.	*minutes.*	*deg.*	*signs.*	*revolu.*
60=	1=	$\frac{1}{60}$=	$\frac{1}{1800}$=	$\frac{1}{21600}$
3600=	60=	1=	$\frac{1}{30}$=	$\frac{1}{360}$
108000=	1800=	30=	1=	$\frac{1}{12}$
1296000=	21600=	360=	12=	1

EXAMPLES.

1 In 6 signs of the zodiac how many minutes?
answer 10800*min.*

2 How many seconds are there in one complete revolution of any planet? *answer* 1296000*sec.*

Application.

1 In 400 quarter dollars how many pounds?
answer 37*l.* 10*s.*

2 How many marks, each 13*s* 4*d.* are in 496*l* 13*s* 4*d*?
answer 745

3 How many English guineas are equal in value to 1260 moidores? *answer* 1620

4 How many ducatoons, of 5*s* 6*d.*½ each, are equal to 476 pieces, at 4*s* 7*d.* each? *answer* 393duc. 3*s.* 9*d.*½

5 By what must 6*l* 17*s* 3*d.*½ be multiplied, to produce a product of 123*l* 11*s* 3*d.*? *answer* 18

6 How many plates, of 12 ounces each, may be manufactured out of 8 ingots of silver, each 36 ounces?
answer 24

7 If a ship's cargo be 250 pipes, 130 hogsheads, and 150 half ditto; how many gallons in all? And allowing every pint to be a pound, what burden was the ship of?
answer 44415 gallons, 158*T.* 12*C.* 2*qr.*

8 What number of canisters, each to hold 38*lb.* may be filled from 28 chests of tea, each 2*C* 1*qr.* 14*lb*?
answer 196

9 How many parcels of 6*lb.* 8*lb.* 12*lb.* and 16*lb.* can a grocer have out of two hogsheads of tobacco, each weighing neat 4*C.* 3*qr.* 24*lb.* and to have of each a like number?
answer 26 of each, and 20*lb.*

10 How many barley corns would reach round the terrestrial globe, which is 360 degrees, and each degree 69½ miles? *answer* 4755801600 barley corns.

11 How many boxes, each to hold 24*lb.* may be filled out of two hogsheads of tobacco, each containing 7*C.* 2*qr.*
answer 70

12 Received from Jamaica 56 hogsheads of sugar, each 12*C.* 1*qr.* 10*lb.* (100*lb.* being their hundred weight) how many hundred weight here, of 112*lb.* *answer* 617*C.* 2*qr.*

13 Imported from Rotterdam 46 bales of cloth, each containing 24 pieces, and each piece 42 ells Flemish; how many yards were therein? *answer* 34776 yards.

14 How many steps of 2*ft.* 8*in.* 2*b.c.* will a man take in walking 7*M.* 1*fur.* 94*yds.* *answer* 13923+

15 A carriage wheel is 17*ft.* 2*in.* 1*b.c.* in circumference, and turns 12898 times; the distance is required?
answer 42+miles.

16 How many seconds of time have passed since the creation of the world, including the year 1790?
answer 182844734400 seconds.

17 If 2*yds.* 3*qrs.* of cloth will make a coat, 1*yd.* 1*qr.* a waist-coat, and 1*yd.* 1*qr.* 2*na.* a pair of breeches; what number of yards will it take to make complete suits for 450 men; *answer* 2418*yds.* 3*qrs.*

18 How many rings, each weighing 5*dwt.* 7*gr.* may be made of 3*lb.* 5*oz.* 16*dwt.* 2*gr.* of gold? *answer* 158

THE SINGLE RULE OF THREE.

THE single rule of three is that wherein three numbers, or terms, are given, two of which are of one kind, to find a fourth proportional number of the same name with the other given term; and this consists of two proportions, *viz.* direct and inverse.

RULE for Stating, &c.

Of the two similar terms, set that in the first place which implies the supposition, that of the same kind with the term sought in the second place, and that on which the demand lies in the third. If the first and third be not of one denomination, reduce both to the lowest in either, and the second to its lowest given denomination; then consider whether the proportion be direct or inverse.

DIRECT

DIRECT PROPORTION.

Direct proportion is that wherein the third term is greater than the first, and requires the fourth term to be greater than the second; or the third less than the first, and requires the fourth to be less than the second;

For as often as the third term is greater or less than the first, so many times will the fourth be greater or less than the second. Thus,

yds. dols. *yds.* dols.
As { 3 .. 6 :: 9 .. 18 more requiring more.
20 .. 40 :: 5 .. 10 less requiring less.

RULE.

Multiply the second and third terms together, and divide the product by the first; the quotient will be the fourth term, or answer: in the same name with the second.

PROOF.

Invert the question, beginning with the answer; and the result will be the first term; thus the preceding:

dols. *yds.* dols. *yds.*
As { 18 .. 9 :: 6 .. 3
10 .. 5 :: 40 .. 20 } the first term.

Note. The operation may frequently be contracted by dividing the dividing term, and either of the other two one by the other; or, by any number that will divide them both without remainder, and using their quotients in their stead; cancelling the figure so contracted, as denoted by this ′ dash in the two subsequent examples.

Thus, If 24 yards cost 60*s.* what are 8 yards worth?

Yds. *s.* *yd.*
As $\cancel{24}$ .. $\cancel{60}$ :: $\cancel{8}$
$\cancel{3}$ 20*s.* *answer*
That is, 24÷8= 3
and 60÷3=20*s.*

12)
As $\cancel{24}$ .. $\cancel{60}$ :: $\cancel{8}$
2 . 5
8
2)40
answer 20*s.*

12)
As $\cancel{24}$ .. $\cancel{60}$ :: $\cancel{8}$
$\cancel{2}$ 5 4
4
answer 20*s.*

EXAMPLES.

1 If 3oz. of silver cost 17s. what is the value of 48oz.?

oz. s. oz.
If 3 ·· 17 :: 48
17
3)816
2|0)27|2
£. 13 12s. answer.

contracted.

oz. s. oz.
If 3 ·· 17 :: 48
16 —
16
2|0)27|2 —
£. 13 12s.

2 If 8 yards of cloth cost 3dol. 20cts. what will 96 yards come to? *answer* 38,40

3 How many yards of cloth may be bought for 38dol.40ct. when 8 yards cost 3dol. 20cts. *answer* 96 yards.

4 What will 9 yards of cambric cost, at the rate of 44*l*. 16*s*. for 72 yards? *answer* 5*l* 12*s*.

5 If 96*lb*. of sugar cost 9dol. 60ct. what is it per *lb*? *answer* 10cts.

6 What is the value of 1 hundred weight of sugar, at 8*d*. per *lb*. *answer* 3*l* 14*s* 8*d*.

7 At 15*d*. per *lb*. what is loaf sugar per hundred weight? *answer* 7*l*.

8 What is the price of a barrel of beer, at 16*d*. per gallon? *answer* 2*l* 2*s*.

9 If 19 dozen pair of hose cost 136dol. 80ct. what is that per pair? *answer* 60cts.

10 Sold three hundred weight of tobacco, at 20cts. per *lb*. what is the amount? *answer* 67,20

11 If one hundred weight of iron be worth 1*l* 8*s*. what is the value of 33*C*. 1*qr*. 22*lb*? *answer* 46*l* 16*s* 6*d*.

12 Bought 12 pieces of cloth, each 12 yards, at 1dol. 40cts. per yard; what come they to? *answer* 201,60

13 If 36*oz*. 10*dwt*. of silver be worth 9*l* 2*s* 6*d*. what is that per ounce? *answer* 5*s*.

14 When a bankrupt compounds with his creditors, at 70cts. in the dollar; what is the merchant's quota, to whom he owes 1000dols. *answer* 700dols.

15 What is tobacco an ounce, when 17*C*. 3*qr*. 17*lb*. sell for 133*l* 13*s* 4*d*? *answer* 1*d*.

16 What quantity of sugar will 23*l* 10*s* buy, at 2 per hundred weight? *answer* 17*C.* 2*qr.*

17 What do 518*lb.* of tea come to, if 90*lb.* cost 18*l.* what is it per pound? *answer* 103*l* 12*s.* at 4*s.* pe

18 If 17 *T.* 12*C.* of iron cost 440 dollars, what is th two hundred weight? *answer*

19 If a man's daily income be 2dols. 40cts. how mu that per annum? *answer* 876

20 Bought 14 bags of hops, each containing 546*lb* 48 English guineas? what was the value of 1 hundred w in Pennsylvania currency? *answer* 1*l* 4*s*

21 What sum will pay for 3 casks of brandy, conta 58, 62 and 65½ gallons, at 89 cents per gallon?

answer 165 dollars, 9 cents, 5

22 What will 4 pieces of cloth come to, containin 24, 25 and 27 yards, at 72 cents per yard?

answer

23 Bought four pieces of linen, two of which cont 26½ yards each, and each of the others 23¾ yards; wha they come to, at 44 cents per yard? *answer*

24 A draper bought 242 yards of broad cloth for 10*s.*; for 86 yards of which he gave 21*s* 4*d* per yard; was the price per yard of the remainder? *answer* 20*s*

25 What must be paid for 53 ells English 1*qr.* of land, at the rate of 7*s* 9*d.*½ per yard?

answer 25*l* 18*s*

26 What quantity of sugar may be bought for 26*l* 1 when the price of 43*C.* 2*qr.* is 159*l* 2*s.*

answer 7*C.*

27 A person failing in trade, owes 977*l.* and the inve of his effects amounts to but 420*l* 6*s* 3*d.*¼, how muc this produce per pound to his creditors? *answer* 8*s*

28 What must be given for a piece of silver weighing 5*oz.* 15*dwt.* at 5*s* 9*d.* per ounce? *answer* 25*l* 10*s*

29 Bought 3 casks of raisins, each weighing 3*C.* 1*qr* neat; what will they cost, at 2*l* 6*s* 6*d.* per hundred we

answer 23*l* 2*s*

30 What will a tax upon 763*l* 15*s.* be, at the rate 6*d.* per pound? *answer* 133*l* 13*s*

31 How many ells English of Holland may be bough 25*l* 18*s* 1*d.*¾ at 7*s* 9*d.*½ per yard? *answer* 53*E.*

32 What will 1 *qr.* 1*na.* of velvet cost, at 18*s* 6*d.* per yard? *answer* 5*s* 9*d* 1*qr.* $\frac{1}{2}$

33 A bankrupt compounds with his creditors, for 8*s* 7*d.*$\frac{1}{4}$ per pound; and at that rate pays them 420*l* 6*s* 3*d.*$\frac{1}{4}$; how much was he indebted? *answer* 977*l.*

34 What is the value of a silver tankard, weighing 1*lb.* 7*oz.* 14*dwt.* at 6*s* 4*d.* per ounce? *answer* 6*l* 4*s* 9*d.*$\frac{1}{5}$

35 What must be paid for 7 casks of prunes, each weighing 2*C.* 1*qr.* 14*lb.* at 2*l* 19*s* 8*d.* per hundred weight? *answer* 49*l* 11*s* 11*d.*$\frac{1}{2}$

36 At 1*l* 7*s* 8*d.* per acre, what is the annual rent of 173*A.* 2*R.* 14*P.*? *answer* 240*l* 2*s* 7*d.*

37 If 5 yards of cloth cost 14*s* 2*d.* what must be given for 9 pieces, containing each 21*yds.* 1*qr.* *answer* 27*l* 1*s* 10*d.*$\frac{1}{2}$

38 If a person's estate be worth 3858 dollars, 24 cents, a year, out of which he saves 1200 dollars, how much per day will the remainder be? *answer* 7,28+

39 If a man's annual income be 1333 dollars, and he expends daily 2 dollars 14 cents, how much will he save at the year's end? *answer* 551,90

40 If a staff, 4 feet long, cast a shade (on level ground) 7 feet; what is the height of that steeple whose shade, at the same time, measures 198 feet? *answer* 113*ft.*$\frac{1}{7}$

41 The earth being 360 degrees in circumference, turns round on its axis in 24 hours; how far are the inhabitants at the equator carried in one minute, a degree there being 69$\frac{1}{2}$ miles? *answer* 17*M.* 3*fur.*

42 A merchant would lay out in spices 1498 dollars, viz. cloves at 53 cents per pound, mace at 94 cents, cinnamon at 40 cents, and nutmegs at 27 cents, and he would have an equal quantity of each sort; what must that quantity be? *answer* 700*lb.* of each sort.

43 A goldsmith bought of a merchant 14*lb.* 3*oz.* 8*dwt.* of gold, for 1371 dollars 20 cents, how much per ounce? *answer* 8 dollars.

44 How many reams of paper at 1 dollar 66 cents, 1 dollar 97 cents, and 2 dollars 31 cents per ream, and of each an equal number, may be purchased with 528 dollars 66 cents? *answer* 89 reams of each sort.

45 If 9C. 3*qr.* of sugar cost 27*l* 17*s* 6*d.* what will 2*C.* 1*qr.* 11*lb.* cost? *answer* 6*l* 14*s* 3*d.*

46 Sold 59*C.* 1*qr.* 14*lb.* of sugar, at 28*s* 7*d.* per hundred weight, what was the amount? *answer* 84*l* 17*s* 1*d.*$\frac{1}{2}$

47 Bought 476*A*. 3*R*. 28*P*. of land; at 9 dollars per acre; the value thereof is required? *facit* 4292,32 5*m*.

INVERSE PROPORTION.

Inverse* proportion is that in which the third term is greater than the first, and requires the fourth to be less than the second; or, the third less than the first, and requires the fourth to be greater than the second: For, as often as the third term is greater or less than the first, so many times will the fourth be respectively less or greater than the second. Thus;

As
Men. Days. Men. Days.
4 .. 6 : : 8 .. 3 more requiring less.
In.wd.In.lg.In.wd.In.lg.
12 .. 12 : : 3 .. 48 less requiring more.

RULE.

Multiply the first and second terms together, and divide the product by the third term; the quotient will be the fourth term, or answer.

PROOF.

As in direct proportion: Thus;

As
Days. Men. Days. Men.
3 .. 8 : : 6 .. 4
In.lg.In.wd.In.lg.In.wd.
48 .. 3 : : 12 .. 12=1 foot square.

Note. See the last note.

EXAMPLES.

1 If 48 men can build a wall in 24 days; how many men can do the same in 192 days?

D. *M.* *D.*
As 24 .. 48 :: 192
24
192
96
Men.
192)1152(6 *answer.*
1152

Contracted.
As $\cancel{24} \cdot\cdot \cancel{48} :: \cancel{192}$
answer 6 *men.*

that is, 192÷24=8
and 48÷ 8=6

2 Wha

2 What quantity of shalloon, that is 3*qrs.* of a yard wide, will line 7½ yards of cloth, that is 1½ yard wide? *answer* 15 yards.

3 If 100 men can finish a piece of work in 12 days, how many are sufficient to do it in three days? *answer* 400 men.

4 How much in length, that is 4½ inches broad, will make a square foot? *answer* 32 inches.

5 How many yards of matting, 2 feet 6 inches broad, will cover a floor that is 27 feet long and 20 broad? *answer* 72 yards.

6 How many yards of cloth 3*qrs.* wide are equal in measure to 30*yds.* of 5*qrs.* wide? *answer* 50 yards.

7 If 100*l.* principal in 12 months gain 6*l.* interest, what principal will gain the same in 8 months? *answer* 150*l.*

8 How many yards of paper, 1¼ yard wide, will be sufficient to hang a room, which is 20 yards in circumference, and 4 in height? *answer* 64 yards.

9 How many men must be employed to finish a piece of work in 15 days, which five men can do in 24 days? *answer* 8 men.

10 In how many days will 8 men finish a piece of work, which 5 men can do in 24 days? *answer* 15 days.

11 If a footman perform a journey in 3 days, when the days are 16 hours long, how many days will he require, of 12 hours long, to perform the same in? *answer* 4 days.

12 If 6 men can reap a field of wheat in 12 days, in what time will 24 men do it? *answer* 3 days.

13 How much in length, that is 8 poles in breadth, must be taken to contain an acre? *answer* 20 perches.

14 A lent B 500*l.* for 6 months; how long ought B to lend A 220*l.* to be equivalent? *answer* 13*mo.* 19*da.*

15 If, when the price of a bushel of wheat is 4*s* 6*d.* the penny loaf weighs 12 *oz.* what must the penny loaf weigh, when a bushel is worth but 3*s.* *answer* 18 *oz.*

16 What is the weight of a pea to a steelyard, which, being suspended 39 inches from the center of motion, will equipoise 208*lb.* suspended at the draught end 3 quarters of an inch? *answer* 4*lb.*

17 Suppose 800 persons in garrison with provision sufficient for two months; how many must depart, that the provision may serve them 5 months? *answer* 480

18 How many yards of matting, that is half a yard wide, will cover a room that is 18 feet wide and 30 long?
answer 120 yards.

19 How wide must a lot of ground be to contain an acre, when it is 13½ poles in length?
answer 11*P.* 4*yds.* 2*ft.* 0*in.* 2*b.c.*

20 If, when the price of a bushel of wheat is 6*s* 3*d.* the penny loaf weighs 9*oz.* what ought it to weigh, when wheat is at 8*s* 2*d.*½ per bushel? *answer* 6*oz.* 13*dr.*

21 In what time will 600*l.* gain 50*l.* interest, when 80*l.* would gain it in 15 years? *answer* 2 years.

Application.

1 If 3 quarters of a yard of velvet cost 7*s* 3*d.* how many yards can I buy for 13*l* 15*s* 6*d.*? *answer* 28*yds.* 2*qr.*

2 If an ingot of gold weighing 9*lb.* 9*oz.* 12*dwt.* be worth 411*l.* 12*s.* what is that per grain? *answer* 1*d.*¾

3 A borrowed of B 250*l.* for 7 months; and in return lends him 300*l.* how long ought B to keep it, that the interest of it may be equal to that of the first sum?
answer 5*mo.* 25*d*

4 If a person's income be 500 guineas a year, and he spend 19*s* 7*d.* sterling per day; how much will he have saved at the year's end? *answer* 167*l* 12*s* 1*d.* sterling.

5 At 13*s* 2*d.*½ per yard, what is the value of a piece of cloth containing 52 English ells and 3*qrs.*?
answer 43*l* 8*s* 5*d.*¼

6 If 30 men can perform a piece of work in 11 days; how many men will accomplish another piece of work, four times as large, in 12 days? *answer* 110 men.

7 The rents of a whole parish amount to 1750*l.* on which is assessed 32*l* 16*s* 3*d.* what is that in the pound?
answer 4*d.*½

8 Bought three tons of oil for 151*l* 14*s.* 85 gallons of which being damaged, I desire to know how I may sell the remainder per gallon, so as neither to gain nor lose thereby?
answer 4*s* 6*d.*¼

9 If the carriage of 5*C.* 14*lb.* for 96 miles, be 32*s* 6*d.* how far may I have 3*C.* 1*qr.* carried for the same money?
answer 151*M.* 3*fur.* 3*P.*

10 Bought 200 yards of cambric for 90*l.* which being damaged, am willing to lose 7*l* 10*s.* by the whole, at what rate then must it sell per ell English? *answer* 10*s* 3*d.*¾

11 If for 48*s.* 225*C.* be carried 512 miles, how many hundred weight may be carried 64 miles for the same money? *answer* 1800*C.*

12 Bought a parcel of cloth, at the rate of 6*s* 6*d.* for every two yards, of which a certain quantity was sold at the rate of 18*s* 9*d.* for every five yards, and gained thereby as much as 180 yards cost; how many yards were sold? *answer* 1170 yards.

13 A certain steeple projected upon level ground a shadow to the distance of 633*ft.* 4*in.* when a staff 3 feet in length, perpendicularly erected, cast a shadow 6*ft.* 4*in.* from hence the height of the steeple is required? *answer* 100 yards.

14 If 12 yards of yard wide stuff exactly line 8 yards of silk of another breadth; how many yards of the latter will line 24 pieces of the former, each piece containing 20 yards? *answer* 320 yards.

15 Laid out 100*l.* upon serges and shalloons; the value of the shalloons was 60*l.* and the quantity of serge 237 yards; also for every two yards of serge there were three of shalloon; how many yards of shalloon were there, and what was the value of one yard of each sort?

answer 355½*yds.* shalloon, 3*s* 4*d* ½ + each per yard.

16 How many pieces of Holland, each 33 ells Flemish, 1*qr.* 2*na.* may be had for 118*l* 17*s* 7*d.*½, when 4 ells English cost 1*l* 7*s* 10*d.*? *answer* 16 pieces 33 ells 1*qr.* 1*na.*

17 A factor bought 64 pieces of Holland, which cost him 352*l.* at 5*s* 6*d.* per ell Flemish; how many yards were there in all, and how many ells English in each piece?

answer 960*yds* 12 ells each piece.

18 If a pole, perpendicular to the horizon, of 50*ft.* 11*in.* in length, when the sun is on the meridian, cast a shadow 98*ft.* 6*in.* long; what is the breadth of a river, that, running due east and west within 20*ft.* 6*in.* on the north side of the foot of a steeple, 300*ft.* 8*in.* high, which at the same time casts the extremity of its shadow 30*ft.* 9*in.* beyond the stream? *answer* 176*yds.* 2*ft.* 4*in.*

19 Of what length must a board be, that is 7½*in.* wide, to measure 20 square feet? *answer* 32 feet.

20 A and B depart from the same place, and travel the same road; but A goes 5 days before B, at the rate of 20

miles a day; B follows at the rate of 25 miles a day; in what time and what distance will he over take A?

answer 20 days and 500 miles.

21 If 50 gallons of water, in one hour, fall into a cistern containing 230 gallons, and by a pipe in the cistern, 35 gallons run out in an hour; in what time will it be filled?

answer 15*h.* 20*min.*

22 A certain cistern has four pipes; by the first it will be filled in 10 minutes, by the second in 20, by the third in 40, and by the fourth in 80; in what time will all four, running together, fill it? *answer* 5*min.* 20*sec.*

23 Astronomers compute the earth's orbit, or track which it describes round the sun in 365 days 6 hours, to be about 596900000 miles; how far then, per minute, must we be carried through the firmament by this wonderful motion?

answer 1134+ miles.

24 Isaac Newton, and others, have found by nice experiments, that sound flies at the rate of 1142 feet per second, and a person in health has about 75 beats of the artery or pulsations in a minute; now the breadth of a river is required, at one side of which A, firing a gun, B, directly opposite at the other, counts six pulsations at his wrist between seeing the flash and hearing the report?

answer 5481*ft.* or 1 mile 201*ft.*

25 If the report of a piece of ordinance be heard one minute and three seconds after the flash was observed; the distance is required? *answer* 13 miles 5 furlongs.

THE DOUBLE RULE OF THREE.

THE double rule of three is that, wherein five numbers or terms are given to find a sixth, three of which are a supposition, and two a demand; and is either direct or inverse.

RULE for Stating.

Set the two terms of the supposition, which are like those of the demand, one under the other, in the first place; that of the same kind with the term sought in the second, and the two demanding terms in the third place, with the two

corresponden-

25
25
125

correspondent terms of the supposition and demand in the same line, and of one denomination; as in the subsequent examples, viz.

1 If three men in 4 days eat 5*lb.* of bread, how much will suffice 6 men for 12 days?

$$\text{If } \left.\begin{array}{r}3m.\\4d.\end{array}\right\}\ 5lb.\ \left\{\begin{array}{l}6m.\\12d.\end{array}\right.$$

2 If 3 men eat 5*lb.* in 4 days; in how many days will 6 men consume 30*lb.*

$$\text{If } \left.\begin{array}{r}3m.\\5lb.\end{array}\right\}\ 4da.\ \left\{\begin{array}{l}6m.\\30lb.\end{array}\right.$$

To know whether the stating be direct or inverse: Consider the upper pair of extremes, and the lower, each separately; with the middle term, as a stating of the single rule, and try them as taught in that rule: if both lines be direct, the stating is in direct proportion; but of inverse, if either pair of the extremes be so. Thus, the first example above is direct, and the second inverse.

DIRECT PROPORTION.

RULE.

Divide the continual product of the two last extremes and middle term by that of the two first, and the quotient will be the sixth term, or answer.

PROOF.

By two statings of the single rule of three.

Note. If either of the two firſt terms, or both, will divide, or can be divided by any of the three laſt, or by any other number without remainder, the operation may be abbreviated by cancelling them, and uſing their quotients or aliquot-parts in their ſtead.

EXAMPLES.

1 If three men in four days eat 5*lb.* of bread; how much will suffice 6 men for 12 days?

$$\begin{array}{llll}\text{If} & \left.\begin{array}{r}3m.\\4d.\end{array}\right\} & 5lb & \left\{\begin{array}{l}6m.\\12d.\end{array}\right.\\ & \overline{12} & & \overline{72}\\ & & & 5\\ & & & \overline{12)360}\\ & & \text{answer} & \overline{30lb.}\end{array} \qquad\qquad \begin{array}{llll}\text{If} & \left.\begin{array}{r}\cancel{3}m.\\\cancel{4}d.\end{array}\right\} & 5\ lb. & \left\{\begin{array}{l}\cancel{6}m.(2\\\cancel{12}d.(3\end{array}\right.\\ & & & \overline{6}\\ & & & 5\\ & & & \overline{30lb.}\end{array}$$

2 Suppose 4 men in 12 days mow 48 acres; how many acres can eight men mow in 16 days? *answer* 128 acres.

3 If 12 oxen in 16 days eat 20 acres of grass; how many acres will serve 24 oxen 48 days? *answer* 120 acres.

4 If 10 bushels of oats be sufficient for 18 horses 20 days; how many bushels will serve 60 horses 36 days, at that rate? *answer* 60 bushels.

5 If 56*lb.* of bread be sufficient for 7 men 14 days; how many pound will suffice 21 men 3 days? *answer* 36*lb.*

6 If 8 men have 3*l* 4*s.* for 4 days work; how much ought 48 men to receive for 16 days? *answer* 76*l* 16*s.*

7 If 700 dols. in half a year raise 14 dols. interest; what will be the interest of 400 dols. for 5 years? *ans.* 80 dols.

8 If 112 acres of grass be mowed by 16 men in 7 days; how many acres may 24 men mow in 19 days? *answer* 456 acres.

9 If 16*l* 18*s.* be the wages of 16 men for 8 days; what sum will 32 men earn in 24 days? *answer* 101*l* 8*s.*

10 If 75*l.* in 9 months amount to 78*l* 7*s* 6*d.* at what rate per cent is the interest computed? *answer* 6*l* per cent.

11 Suppose the wages of 6 persons for 21 weeks be 120*l.* what will be the hire of 14 persons for 46 weeks? *answer* 613*l* 6*s* 8*d.*

12 What is the interest of 259*l* 13*s* 5*d.* for 20 weeks, at 5 per cent? *answer* 4*l* 19*s* 10*d.* $\frac{1}{4}$

13 If 2 men can do 12 rods of ditching in 6 days; how many rods may be done by 8 men in 24 days? *answer* 192 rods.

14 If the carriage of 8*C.wt.* 128 miles cost 6,40 what must be paid for the carriage of 4*C.wt.* 32 miles? *answer* 80cts.

15 If 200*lb.* be carried 40 miles for 40cts. how much must be paid at that rate for the carriage of 20200*lb.* 60 miles? *answer* 60,60

16 If the freight of 9 hogsheads of sugar, each weighing 12 hundred weight, for 20 leagues, cost 16*l.* what must be paid for the freight of 50 casks of ditto. each weighing 2½ hundred weight, 100 leagues? *answer* 92*l* 11*s* 10*d.*

INVERSE.

INVERSE PROPORTION.

RULE.

Transpose the inverse extremes; that is, set that of the first place under the third, and that in the third under the first; then work as in direct proportion.

Note. See the note in direct proportion.

EXAMPLES.

1 If 7 men can reap 84 acres of wheat in 12 days; how many men can reap 100 acres in 5 days?

$$\text{If } \left.\begin{array}{r}84A.\\ \cancel{12}d.\end{array}\right\}\ 7m.\ \left\{\begin{array}{l}100A.\\ \cancel{5}d.\end{array}\right.\ \text{Inverse term.}$$

$$\begin{array}{rcr} 5 & & 12 \\ \hline 420 & & 1200 \\ \hline & & 7 \\ \hline \end{array}$$

42|0)840|0(20*m.* *answer.*
84
------
00
------

Contracted.

$$\text{If } \left.\begin{array}{r}\cancel{84}A.\\ \cancel{12}d\\ \cancel{5}\\ \cancel{1}\end{array}\right\}\ \cancel{7}m.\ \left\{\begin{array}{l}\cancel{100}A.(20 \text{ men.}\\ \cancel{5}d.\\ \cancel{12}\end{array}\right.$$

2 If 4 dollars be the hire of 8 men for three days; how many days must 20 men work for 40 dols? *answer* 12 days.

3 If 4 men have 24 shillings for three days work; how many men will earn 4*l* 16*s.* in 16 days? *answer* 3 men.

4 Suppose the interest of 333*l* 6*s* 8*d.* for 9 months be 15*l.* what principal in 12 months will gain 6*l.*? *answer* 100*l.*

5 If 200*lb.* be carried 40 miles for 40 cts; how far may 20200*lb.* be carried for 60,60? *answer* 60 miles.

6 If 145 men can make a wall 32 feet high, and 40 feet long, in 8 days; in how many days can 68 men build a wall 28 feet high, of the same length? *answer* 14days, 11*h.* +

7 If a footman, when the days are 14 hours long, can travel 276 miles in 16 days; in how many days can he travel 852 miles, when the days are but 12 hours long?
answer 57 days 7 hours. +

8 If 15 men eat 3 shillings worth of bread in 6 days, when wheat is sold at nine shillings per bushel; how many days will 30 men require to eat 13*s* 4*d.* worth, when wheat is at 6*s.* per bushel? *answer* 20 days.

9 If 100*l.* principal in 12 months gain 8*l.* interest; what principal will gain 8*l* 12*s.* in 5 months? *answer* 258*l.*

10 Suppose 100*l.* will defray the expences of 5 men for 22 weeks and 6 days; how long will 12 men be spending 150*l.* *answer* 14 weeks 2 days.

Application.

1 If 7 bushels of malt be sufficient for 7 persons 4 months, how many bushels will serve 46 persons 10 months?
answer 115 bushels.

2 How many men must be employed to reap 240 acres in 12 days, if 36 men can reap 60 acres in 5 days?
answer 60 men.

3 If 5 men make 300 pair of shoes in 40 days; how many men may make 900 pair in 60 days? *answer* 10 men.

4 A porter having received 42 shillings for the carriage of 3*C.wt.* 150 miles; how much ought he to have for the conveyance of 7*C.* 2*qr.* 14*lb.* 50 miles? *answer* 35*s* 7*d.*

5 A person having engaged to remove 8000*C.wt.* a certain distance, in 9 days, with 18 horses, in 6 days he removed 4500*C.wt.* how many horses will be required to remove the remainder in the remaining 3 days? *answer* 28 horses.

6 If 20 hundred weight be carried 50 miles for 5*l.* how much will forty hundred weight cost, to be conveyed 100 miles? *answer* 20*l.*

7 A farmer having sown 48 bushels, found that it produced 576 bushels the first year; now supposing he sows 240 bushels of grain each year for 6 years successively; what will be his whole increase at the expiration of the last year?
answer 17280 bushels.

8 If 12 men in 6 days reap 80 acres; in how many days will 25 men reap 200 acres? *answer* $7\frac{1}{5}$ days.

9 An usurer put out 86*l.* to receive interest for the same; and when it had continued 8 months, he received for principal and interest 88*l.* 17*s.* 4*d.* query the rate per cent?

answer 5 per cent.

PRACTICE.

PRACTICE is the short method of finding the value of any quantity of goods, by the given price of an integer.

Note. See the rules in the several cases under this head.

PROOF.

Practice may be proved by varying the parts; by compound multiplication; or, by the single rule of three direct.

TABLES.

qr.		
1 =	$\frac{1}{4}$	of 1*d.*
2	$\frac{1}{2}$	

d.		
1 =	$\frac{1}{12}$	of a shilling.
$1\frac{1}{2}$	$\frac{1}{8}$	
2	$\frac{1}{6}$	
3	$\frac{1}{4}$	
4	$\frac{1}{3}$	
6	$\frac{1}{2}$	

s.	*d.*		
1	0 =	$\frac{1}{20}$	of a pound.
1	8	$\frac{1}{12}$	
2	0	$\frac{1}{10}$	
2	6	$\frac{1}{8}$	
3	4	$\frac{1}{6}$	
4	0	$\frac{1}{5}$	
5	0	$\frac{1}{4}$	
6	8	$\frac{1}{3}$	
10	0	$\frac{1}{2}$	

lb.		
7 =	$\frac{1}{16}$	of an *C.wt.*
8	$\frac{1}{14}$	
14	$\frac{1}{8}$	
16	$\frac{1}{7}$	
28	$\frac{1}{4}$	
56	$\frac{1}{2}$	

CASE 1.

When the price of an integer is less than a penny;

RULE.

Take such aliquot part or parts of the given quantity, as the price is of a penny, for the answer in pence; which reduce to pounds.

Note 1. When the complement of the given price, in any caſe, is an aliquot part, deduct the ſaid aliquot part of the given quantity therefrom and the remainder will be the anſwer, of the ſame denomination with the integer of which the diviſor is a part.

2. When a remainder occurs in any example, either in this or the following caſes, let it be reduced to the next lower denomination, &c.

EXAM-

EXAMPLES.

1 7612*lb.* at ¼ per *lb.* and at ¾.

| ¼ | ¼ | 7612
| | 12 | 1903
| | 2|0 | 15|87

facit £. 7 18 7

7612
1903
12)5709
2|0 47|59
£. 23 15 9

					£.	s.	d.
2	6812	at	½	*facit*	14	3	10
3	4712	at	¾		14	14	6
4	15344	at	¼ }		15	19	8
5	7672	at	½ }				
6	9424	at	¾		29	9	0

CASE 2.

When the given price of an integer is a penny, or more, but less than a shilling;

RULE.

Take such part or parts of the given quantity, as the price is of a shilling, for the answer in shillings.

EXAMPLES.

1 7612 yards, at 1*d.* per yard, and at 11*d.*

| 1 | $\frac{1}{12}$ | 7612
| | 2|0 | 634 4

facit £.31 14 4

7612
$\frac{1}{12}$=6344
2|0)69 7|7 8
£.348 17 8

			d.		£.	s.	d.
2	8612	at	1¼	*facit*	44	17	1
3	1218	at	2½		12	13	9
4	7812	at	3¾		122	1	3
5	8120	at	4		135	6	8
6	8121	at	5¼		177	12	11¼

			d.		£.	s.	d.
7	1218	at	6½	*facit*	32	19	9
8	6120	at	7¾		197	12	6
9	7100	at	8		236	13	4
10	4121	at	9¼		158	16	7
11	1002	at	10½		43	16	9
12	2345	at	11¾		114	16	1¾
13	6002	at	4½		112	10	9
14	3001	at	9				
15	7182	at	5		149	12	6
16	3591	at	10				
17	6128	at	5½		140	8	8
18	3064	at	11				

CASE 3.

When the given price of an integer is more than one shilling, and less than two;

RULE.

Let the given quantity stand for so many shillings, to which add the amount in shillings of said quantity at the overplus price, found by case 1 or 2, for the answer in shillings.

EXAMPLES.

1 486 gallons, at 12*d.*¼ per gallon.

¼	¼	4 8 6
	12	1 2 1½
		1 0 1½
	2|0	49 | 6 1½

facit £. 24 16 1½

			d.		£.	s.	d.
2	6100	at	13½	*facit*	343	2	6
3	1210	at	14¾		74	7	3½
4	1260	at	15		78	15	0
5	7121	at	16¼		482	3	0¼
6	2340	at	17½		170	12	6
7	7890	at	18¾		616	8	1½

8 8900

			d.		£.	*s.*	*d.*
8	8900	at	19	*facit*	704	11	8
9	7120	at	20¼		600	15	0
10	2100	at	21½		188	2	6
11	6812	at	22¼		645	14	5
12	9999	at	23¾		989	9	8¼
13	19998	at	23½		1978	19	4½
14	12345	at	14		720	2	6
15	9876	at	17½				
16	7910	at	19½		642	13	9
17	6780	at	22¾				

CASE 4.

When the given price of an integer is any number of shillings under 20;

RULE.

Multiply the quantity by the price for the answer in shillings; Or,

If the price be even shillings, multiply by half the price, and double the first figure of the product for shillings; the rest of the product will be pounds: or,

Work by aliquot parts.

EXAMPLES.

1 486 bushels at 2*s.* per bushel.

		s.
486	486	2 | 1/10 | 486
2	1	
2|0 | 97|2	48*l* 12*s.*	48*l* 12*s.*

facit 48*l* 12*s.*

			s.			£.	*s.*	*d.*
2	121	at	3		*facit*	18	3	0
3	471	at	5			117	15	0
4	191	at	8			76	8	0
5	242	at	11	2		133	2	0
6	600	at	13			390	0	0
7	171	at	16			136	16	0
8	100	at	19	1		95	0	0
9	612	at	9	11		275	8	0
10	306	at	18					
11	860	at	7			301	0	0
12	430	at	14					

CASE 5.

When the given price of an integer is shillings and pence, or shillings, pence and farthings.

RULE.

Take such aliquot part or parts of the given quantity, as the price is of a pound; or,

Multiply by the shillings, and take parts for the rest.

EXAMPLES.

1 7150 yards, at 1*s* 8*d.* per yard.

```
 s. d.                           d.
| 1 8 | 1/12 | 7150            | 6 | 1/2 | 7 1 5 0
|     |      |-------          | 2 | 1/3 | 3 5 7 5
   facit £.595 16 8            |   |     | 1 1 9 1 8
                               |   |     |-----------
                               |   | 2|0 | 1 1 9 1|6 8
                                           -----------
                                   facit 5 9 5 16 8 Proof.
```

			s.	d.		£.	s.	d.
2	569	at	2	6	*facit*	71	2	6
3	69	at	3	4		11	10	0
4	478	at	6	8		159	6	8
5	400	at	13	4		266	13	4
6	789	at	16	8		657	10	0
7	765	at	5	9		219	18	9
8	841	at	13	2		553	13	2
9	807	at	16	5		662	8	3
10	969	at	19	11		964	19	3
11	244	at	5	8½		69	12	10
12	875	at	1	4¾		61	1	4¼
13	7524	at	3	5½		1301	0	6
14	3715	at	9	4½		1741	8	1½
15	2572	at	13	7½		1752	3	6
16	5144	at	6	9¾				
17	4567	at	19	11½		4557	9	8½
18	9134	at	9	11¾				

CASE 6.

When the price of an integer is pounds, or pounds, shillings, &c.

RULE.

RULE.

Multiply the quantity by the pounds, and with the product add the amount at the remaining part of the price, found as before: Or,

Multiply the quantity by the shillings of the price and take parts for the rest.

EXAMPLES.

1 428 tons, at 3*l.* 4*s.* 6*d.*½ per ton.

```
 s.                                           
|4 | 1/5 | 428                                  428
|  |     |   3                                   64
|  |     | ----                                -----
|d.|     | 1284                                 1712
|6 | 1/8 |   85 12                             2568
|½ | 1/12|   10 14                            -----
                17 10                          27392
          ---------                         ½=   214
facit £. 1381  3 10                        1/12=  17 10
          =========                          ----------
                                            2|0)2762|3 10
                                           £. 1381  3 10
```

			£.	s.	d.		£.	s.	d.
2	26	at	11	14	0	facit	304	4	0
3	36	at	5	13	0		203	8	0
4	47	at	3	3	4		148	16	8
5	156	at	3	6	8	}	520	0	0
6	78	at	6	13	4	}			
7	457	at	14	17	9½	}	6804	10	9½
8	914	at	7	8	10¾	}			
9	500	at	12	19	11½	}	6498	19	2
10	1000	at	6	9	11¾	}			

CASE 7.

When both the price of an integer, and the quantity, are of divers denominations;

RULE.

Multiply the price by the integers of the quantity, and take parts of the price for those of the integer.

EXAMPLES.

1. 17*C.* 3qr. 19*lb.* of sugar, at *2l 2s 6d.* per *C.wt.*

qr.		*£.*	*s.*	*d.*
2	½	2	2	6×5
				12+5=17. Or, 4×4+1=17
		25	10	0
		10	12	6
1	½	1	1	3
16*lb.*	⅐		10	7½
2	⅛		6	0¾
1	½			9
				4½
facit £.		38	1	6¾+

	C.	*qr.*	*lb.*		*£.*	*s.*	*d.*		*£.*	*s.*	*d.*
2	12	2	14	at	3	14	0	*facit*	46	14	3
3	37	2	14	at	7	10	9		283	11	11⅓
4	9	2	26	at	4	10	4½		43	19	6
5	5	2	10	at	2	18	6½		16	7	2¼
6	59	1	14	at	1	8	7		84	17	1½
7	72	3	27	at	8	11	5		625	11	10
8	0	2	14	at	3	7	6		2	2	2¼
9	0	0	24	at	4	17	0		1	0	9¾
10	0	0	17	at	3	5	4		0	9	11

	lb.	*oz.*	*dwt.*	*gr.*		*£.*	*s.*	*d.*				
11	27	10	0	0	at	0	1	4	per *lb.*	1	17	1¼
12	13	10	12	8	at	4	7	6		60	14	10¾
13	0	17	6	16	at	3	16	8	per *oz.*	66	8	10½

	Yds	*qr.*		*s.*	*d.*				
14	67	2	at	12	2	per yard.	41	1	3
15	68	1	at	8	1		27	11	8¼
16	419	3	at	12	6	}	262	6	10½
17	839	2	at	6	3	}			

	A.	*R.*	*P.*		*£.*	*s.*	*d.*				
18	476	3	28	at	3	7	11	per *A.* }	1619	11	1¾
19	953	3	16	at	1	13	11½	}			

Application.

Application. Booke

			£.	s.	d.				£.	s.	d.
1	18848*yds.*	at	0	0	0¾	per	*yd.*	*facit*	58	18	0
2	6789*lb.*	at	0	0	1¾	per	*lb*		49	10	0¾
3	3906*gals.*	at	0	0	7½	per	*gal.*		122	1	3
4	2004*oz.*	at	0	0	10½	per	*oz.*		87	13	6
5	12240*yds.*	at	0	1	3½	per	*yd.*		790	10	0
6	1234*lb.*	at	0	1	11¾	per	*lb.*		122	2	3½
7	987*gals.*	at	0	4	0	per	*gal.*		197	8	0
8	543*gals.*	at	0	11	0	per	*gal.*		298	13	0
9	138*bu.*	at	0	6	8	per	*bu.*		46	0	0
10	800*bu.*	at	0	13	4	per	*bu.*		533	6	8
11	875*bu.*	at	0	2	9½	per	*bu.*		122	2	8½
12	94*T.*	at	6	6	8	per	*Ton.*		595	6	8
13	156*T.*	at	13	16	8	per	*Ton.*		2158	0	0
14	2000*T.*	at	6	9	11¾	per	*Ton.*		12997	18	4
15	4000*T.*	at	12	19	11½	per	*Ton.*		51991	13	4

16 Bought 8*C.* 1*qr.* 16*lb.* of tobacco, at 5*l* 17*s* 9*d.* per *C.wt.* what was the amount? *answer* 49*l* 8*s* 3*d.*

17 Sold 16*C.* 2*qr.* 17*lb.* of sugar, at 2*l* 15*s* 11*d.* per *C.wt.* what was its value? *answer* 46*l* 11*s* 1*d.*

18 If 1*C.wt.* of rice cost 3*l* 17*s* 6*d.* what is the value of 144*C.* 2*qr.* 21*lb.* *answer* 560*l* 13*s* 3*d.*¼

19 Sold a pair of silver buckles, weighing 50*dwt.* 20*gr.* at 17*s* 6*d.* per ounce: what did they come to? *answer* 2*l* 4*s* 5*d.*¾

20 Bought 9*T.* 19*C.* 3*qr.* 27*lb.*¾ of iron, at 39*l* 19*s* 11*d.*½ per ton; what was the amount? *answer* 399*l* 19*s* 4*d.*+

21 Sold 19*T.* 19*C.* 3*qr.* 27*lb.*½ at 18*l* 19*s* 11*d.*¾ per ton; required the amount? *answer* 399*l* 19*s* 4*d.*+

22 A merchant sold 289*C.* 1*qr.* [illegible]*lb.* of beef, at 1*l* 18*s* 9*d.* per hundred weight; the value is required? *answer* 560*l* 13*s* 8*d.*¼

23 If one ton of hay be sold for 4*l* 3*s* 7*d.* what will 371*T.* 15*C* amount to? *answer* 1553*l* 12*s* 1*d.*¼

24 Bought 420*oz.* 15*dwt.* 16*gr.* of gold, at 3*l* 16*s* 10*d.*½ per ounce, what is the value thereof? *answer* 1617*l* 7*s* 8*d.*¼

25 Bought sundry pieces of cloth, containing 1157*yds.* 2*qrs.* at 29*s* 4*d.*½ per yard; what come they to? *answer* 1700*l* 1*s* 6*d.*¾

26 If land be rated at 5*l* 17*s* 6*d.* per acre; what is the value of a plantation, containing 1157½ acres?

answer 6800*l* 6*s* 3*d.*

27 Bought 7 casks of wine, each containing 84*gals.* 1*qt.* at 11*s* 3*d.* per gallon; what did they amount to?

answer 331*l* 14*s* 8*d.*¼

28 If a yard of cloth cost 39*s* 4*d.* what is the value of 139*yds.* 3*qrs.*? *answer* 274*l* 16*s* 10*d.*

29 Sold 279½ yards of superfine scarlet cloth, at 3*l* 18*s.* 8*d.* per yard; what did it amount to? *answer* 1099*l* 7*s* 4*d.*

30 What cost 3*qr.* 2*na.* of velvet at the rate of 17*s* 6*d.* per yard? *answer* 15*s* 3*d.*¾

31 What will 12 ounces of silk cost, if 1*lb.* cost 3*l* 10*s.*

answer 2*l* 12*s* 6*d.*

TARE AND TRETT.

TARE and trett are allowances made by the seller to the buyer, on some particular commodities.

Tare is the weight of the barrel, box, bag, or whatever contains the goods; and is either,

First, At so much in whole gross weight;

Second, At so much per box, bag, &c. or,

Third, At so much per hundred weight.

Trett is an allowance for waste and dust, of 4*lb.* in every 104*lb.*

Gross is the weight of the goods, together with that in which they are contained.

Neat is the weight of the goods, after all allowances are deducted.

CASE I.

When the tare is so much in the whole gross weight;

RULE.

Subtract the tare from the gross, the remainder will be the neat.

EXAMPLES.

1 What is the neat weight of 24 hogsheads of tobacco, each weighing 6*C.* [illegible]*qr.* 17*lb.* gross, tare in the whole 17*C.* 3*qr.* 27*lb.* and how much is it worth, at 1*l* 10*s* 6*d.* per *C.wt.*

C.	*qr.*	*lb.*	
6	2	17	
		4×6=24	
26	2	12	
		6	
159	2	16	gross.
17	3	27	tare.
141	2	17	neat.

	£.	*s.*	*d.*
qr.			
2 $\frac{1}{2}$	1	10	6×9
			11
	16	15	6
			12
	201	6	0
lb.	13	14	6
14=$\frac{1}{4}$		15	3
2 $\frac{1}{7}$		3	$9\frac{1}{2}$
1 $\frac{1}{2}$			$6\frac{1}{2}$
			$3\frac{1}{4}$
Amount	216	0	$4\frac{1}{3}$

2 What is the neat weight of 456*C.* 1*qr.* 19*lb.* of tobacco, tare in the whole 15*C.* 2*qr.* 13*lb.* and what is the amount thereof; at 1*l* 15*s* 8*d.* per *C.wt.*

answer neat 440*C.* 3*qr.* 6*lb.* amount 786*l* 1*s* 11*d.*$\frac{3}{4}$

3 How much is the neat weight of 38 hogsheads of tobacco, weighing gross 201*C.* 3*qr.* 12*lb.* tare in the whole 3140*lb.* and what does it come to, at 1*l* 17*s* 6*d.* per hundred weight.

answer neat 173*C.* 3*qr.* 8*lb.* value 325*l* 18*s* 3*d.*$\frac{1}{2}$

4 What is the neat weight of 5 casks of sugar, weighing as follows, viz. No. 1, 4*C.* 2*qr.* 14*lb.* gross, tare 21*lb.* No. 2, 3*C.* 0*qr.* 17*lb.* gross, tare 18*lb.* No. 3, 5*C.* 3*qr.* 10*lb.* gross, tare 1*qr* 11*lb.* No. 4, 6*C.* 1*qr.* 16*lb.* gross, tare 27*lb.* No. 5, 3*C.* 2*qr.* 18*lb.* gross, tare 19*lb.*; And the neat of the three first, at 2*l* 4*s* 7*d.* per hundred weight, of the other two at 2*l* 17*s* 6*d.* what do they amo[illegible] to?

answer neat 22*C.* 2*qr.* 7*lb.* amount 56*l* 10*s* 5*d.*$\frac{1}{4}$

CASE 2.

When the tare is at so much per barrel, box, bag, &c.

RULE.

Multiply the number of bags, boxes, &c. by the tare, subtract the product from the gross, and the remainder will be the neat.

EXAMPLE

EXAMPLES.

What is the neat weight of 12 casks of raisins, each hing 3*C.* 2*qr.* 10*lb.* gross, tare 20*lb.* per cask; and is the value thereof, at 2*l* 14*s* 0*d.* per *C.wt.*

qr. lb.	*lb*		*qr.*		*£.*	*s.*	*d.*
2 10	20		2	½	2	14	0
12	12						4
		4)					
0 8 gross.	28)240(8				10	16	0
0 16 tare.	224						10
		2 0 16					
3 20 neat.	16				108	0	0
			1	¼	1	7	0
			16*lb.*	1/7		13	6
			4	¼		7	8½
						1	11
				Amount *£.*	110	10	1½

In 70 bales of silk, each 317*lb.* gross; tare per bale how many pounds neat, and what do they amount to, *s* 6*d.* per pound?

answer neat 21070*lb.* amount 13168*l* 15*s.*

What is the neat weight and value of 16 hogsheads of co, weighing 86*C.* 2*qr.* 14*lb* gross, tare 100*lb.* per ead; the neat sold at 3*l* 15*s* 10*d.* per *C.wt.*

answer neat 72*C.* 1*qr* 10*lb.* value 274*l* 5*s* 8*d.*¼

old 4 casks of indigo, weighing gross 18*C.* 2*qr.* tare, per cask; what is the neat weight, and value thereof, 5*d.* per *lb.*? *answer* neat 17*C.* 20*lb.* value 432*l* 18*s*

CASE 3.

en the tare is at so much per hundred weight;

RULE.

uct from the gross such aliquot part or parts of it, as e is of an *C.wt* the remainder will be the neat. Or, tiply the pounds gross by the tare per *C.wt.* and divide duct by 112, the quotient will be the tare; which de before.

EXAM-

EXAMPLES.

1 In 12 butts of currants, each 7*C.* 1*qr.* 10*lb.* tare per *C.wt.* 16*lb.* how much neat; and what does it come to, at 3*l* 7*s* 4*d.* per *C.wt.*

	C.	*qr.*	*lb.*	
	7	1	10	
			12	
16 $\frac{1}{7}$	88	0	8	gross.
	12	2	9	tare.
	75	1	27	neat.

	£.	*s.*	*d.*
1*qr.* $\frac{1}{4}$	3	7	4×3
16*lb.* $\frac{1}{7}$			8
	26	18	8
			9
	242	8	0
	10	2	0
		16	10
8 $\frac{1}{2}$		9	7$\frac{1}{4}$
2 $\frac{1}{4}$		4	9$\frac{1}{2}$
1 $\frac{1}{2}$		1	2$\frac{1}{4}$
		0	7
£.	254	3	0 Amount.

2 What is the neat weight and value of 40 kegs of figs, gross 75*C.* 3*qr.* 14*lb.* tare per hundred weight 14*lb.* at 18*s.* 6*d.* per *C.wt.*?

answer neat 66*C.* 1*qr.* 16*lb.* value 61*l* 8*s* 3*d.*

3 Sold 9 hogsheads of sugar, each 6*C.* 2*qr.* 12*lb.* gross, tare per hundred weight 17*lb.* what is the neat weight? And what does it amount to, at 2*l* 12*s* 6*d.* per hundred weight?

answer neat 50*C.* 1*qr.* 22*lb.* amount 132*l* 8*s* 5*d.*$\frac{1}{4}$

4 Bought 4 hogsheads of sugar, weighing 43*C.* 3*qr.* 21*lb.* gross, tare 12*lb.* per hundred weight, required the neat weight and its value, at 2*l* 15*s* 4*d.* per hundred weight?

answer neat 39*C.* 25*lb.* 12*oz.* value 108*l* 10*s* 7*d.*$\frac{4}{5}$

CASE 4.

When trett is allowed with tare;

RULE.

Deduct the tare as before, the remainder is called suttle, which divide by 26, the quotient will be the trett: subtract this from the suttle, and the remainder will be the neat

EXAMPLES.

1 In 27 bags of coffee, each 2*C.* 3*qr.* 17*lb.* gross, tare 13*lb.* per hundred weight, trett 4*lb.* per 104*lb.* what is the weight; and what is its value, at 3*l* 18*s* 9*d.* per *C.wt.*?

lb.	*lb.*	*lb.*
8775 gross.	8775	26)7757(298 trett.
1018 tare.	13	52
7757 suttle.	112)114075(1018 ta.	255
298 trett.	112	234
C. qr. lb.		
Neat 7459=66 2 11	207	217
	112	208
Value 262*l* 4*s* 7*d.*		
	955	9
	896	
	59	

2 In 8*C.* 3*qr.* 20*lb.* gross, tare 38*lb.* trett 4*lb.* in every 104*lb.* how many pounds neat; and what do they come to, at 8*d.*½ per *lb.* *answer* neat 925*lb.* value 32*l* 15*s* 2*d.*½

3 Bought 120*C.* 2*qr.* gross of sugar, tare 176*lb.* trett 4*lb.* per 104*lb.* what is the neat weight, and its value at 2*l* 3*s* 8*d.* per hundred weight?

answer neat 114*C.* 1*qr.* 12*lb.* value 249*l* 13*s* 6*d.*¾

4 Sold 177*C.* 22*lb.* gross, tare 9*lb.* per hundred weight, trett 4*lb.* per 104*lb.* required the neat weight, and its amount at 3*l* 14*s.* per hundred weight?

answer neat 156*C.* 2*qr.* 22*lb.* amount 579*l* 15*s* 6*d.*¼

INTEREST.

INTEREST is a consideration allowed for the use of money: relative to which are four particulars, viz.

First, The principal or sum at interest.

Second, The time the principal is at use.

Third, The rate or interest of 100*l.* for one year.

Fourth, The amount, which is the sum of the principal and interest.

Interest is either simple, or compound.

SIMPLE INTEREST.

Simple interest is that which ariſes from the principal only.

CASE 1.

When the time is any number of years, and the rate per cent. pounds or dollars only;

RULE.

Multiply the principal by the rate per cent. and divide the product by 100, the quotient will be the intereſt for one year; which multiply by the years given.

PROOF.

By the double rule of three: or, it may be proved or calculated practically thus; for the yearly intereſt at five per cent. take $\frac{1}{20}$ of the principal, and increaſe or diminsh it by proportional parts thereof for any other rate: As,

$$\text{For}\left\{\begin{array}{llll} 2\frac{1}{2} & \text{per cent. take} & \frac{1}{2} & \\ 3 & - \quad - & \frac{1}{2}+\frac{1}{10} & \\ 3\frac{1}{2} & - \quad - & \frac{1}{2}+\frac{1}{5} & \\ 4 & \text{Subtract} & \frac{1}{5} & \\ 4\frac{1}{2} & - \quad - & \frac{1}{10} & \\ 5\frac{1}{2} & \quad \text{Add} & \frac{1}{10} & \\ 6 & - \quad - & \frac{1}{5} & \\ 6\frac{1}{2} & - \quad - & \frac{1}{5}+\frac{1}{10} & \\ 7 & - \quad - & \frac{1}{5}+\frac{1}{5} & \end{array}\right\}\textit{of ſaid intereſt at 5 per cent.}\begin{array}{l}\left.\right\}\textit{From ſaid intereſt:}\\ \left.\right\}\textit{To ſaid intereſt.}\end{array}$$

Then, multiply the yearly intereſt by the number of years, and take the parts for the odd time.

EXAMPLES.

1 What is the intereſt of 500*l.* for one year, at 6 per cent. per annum? Also, at all the other preceding rates?

$$\begin{array}{r} £.\ 500 \\ 6 \\ \hline £.\ 30|00 \end{array} \quad \textit{answer } 30l. \text{ at 6 per cent.}$$

		£.	
	$\frac{1}{20}$	500	
		25 at 5 per cent.	
Take	$\frac{1}{2}$	12 10 at $2\frac{1}{2}$	
	$\frac{1}{2}+\frac{1}{10}$	15 0 at 3	
	$\frac{1}{2}+\frac{1}{5}$	17 10 at $3\frac{1}{2}$	
Subtract	$\frac{1}{5}$	20 0 at 4	*answer.*
	$\frac{1}{10}$	22 10 at $4\frac{1}{2}$	
Add	$\frac{1}{10}$	27 10 at $5\frac{1}{2}$	
	$\frac{1}{5}$	30 0 at 6	
	$\frac{1}{5}+\frac{1}{10}$	32 10 at $6\frac{1}{2}$	
	$\frac{1}{5}+\frac{1}{5}$	35 0 at 7	

2 What is the interest of 87*l* 14*s* 5*d.* for one year, at 6 per cent. per annum? *answer* 5*l* 5*s* 3*d.*

3 What is the amount of 173*l.* 17*s* 8*d.*½ for a year, at 7 per cent. per annum? *answer* 186*l* 1*s* 1*d.*¾

4 What will a bond for 176*l* 13*s* 9*d.* amount to in nine years, at 5 per cent. per annum? *answer* 256*l* 3*s* 11*d.*¼

When the principal consists of dollars and cents, multiply by the rate per cent. separate the right hand figure, the others will give the answer in mills.

What is the interest of 550dols. 75cts. at 6 and at 8 per cent. for 4 years?

D. *c.*	*D.* *c.*
550, 75	550, 75
6	8
33045|0	44060|0
4	4
132180 mills.	176240 mills.

CASE

CASE 2.

When the rate per cent. is ¼, ½, or ¾ more than the pounds or dollars given;

RULE.

To the product made by the pounds, or dollars, add ¼, ½, or ¾ of the principal, and divide by 100 for the interest required.

EXAMPLES.

1 What is the interest of 246*l* 18*s*. and of 658 dollars 40 cents, for 5 years, at 4¼ per cent. per annum?

£. s.
¼ | 246 18
4
987 12
61 14 6
£. 10|49 6 6
|20
s. 9|86
|12
d. 10|38
|4
qr. 1|52

£. s. d.
10 9 10¼
5
52 9 3¼ *answer.*

D. c.
¼ | 658 40
4
263360
16460
27982|0
5
ans. 139,91,0 mills.

2 Calculate the interest of a bond for 427*l* 18*s* 9*d*. for 2 years, at 5¾ per cent. per annum. *facit* 49*l* 4*s* 3*d*.

3 What sum will 1096*l* 15*s* 6*d*. amount to in 4 years, at 6½ per cent. per annum? *answer* 1381*l* 18*s* 8*d*.

CASE 3.

When the time given is months, weeks or days, less or more than a year.

RULE.

As the months, weeks, or days in a year,
Are to the interest of the given sum for a year;
So are the months, weeks, or days in the time given,
To the interest required

Or, take aliquot parts of the yearly interest for the given part of a year.

EXAMPLES.

1 What will 300*l.* amount to in 5 years and 10 months at 4¾ per cent. per annum?

```
      £.    mo.  £. s.    mo.  £.   s.  d.
½ |  300 As 12 · 14 5 :: 70 · 83   2   6 Interest.
  |    4                      300   0   0 Principal.
  |-----                      -----------
  | 1200                      383   2   6 answer.
½ |  150                      -----------
  |   75
  ------
£.14|25
    | 20
  ------
 s. 5|00

                  Or, thus,
          mo.           £.  s.
           6 | ½ |      14   5 Interest for 1 year
           4 | ⅓ |           5 Years.
             |   |      -------
             |   |      71   5
             |   |       7   2   6
             |   |       4  15   0
             |   |     -----------
             |   |      83   2   6 Interest.
             |   |     300   0   0 Principal.
             |   |     -----------
             |   |     383   2   6 Amount.
             |   |     -----------
```

2 What is the interest of 57*l* 17*s* 8*d.* for three months, at 6 per cent. per annnm? *answer* 17*s* 4*d.*½

3 How much is the interest of 150*l* 19*s* for three years and 4 months, at 6 per cent. per annum? *answer* 30*l* 3*s* 9*d.*

4 What is the interest of 126*l* 12*s.* for 16 weeks, at 4½ per cent. per annum? *answer* 1*l* 15*s* 0*d.*½

5 How much is the amount of 243*l* 17*s.* for 146 days, at 5¾ per cent? *answer* 249*l* 9*s* 2*d.*

6 What is the interest of 71*l* 3*s* 11*d.*½ for 1 year, 5 months, and 25 days, at 6 per cent. per annum? *answer* 6*l* 6*s* 10*d.*¼

7 What is the amount of a bond for 116*l* 17*s* 2*d.* for 6 years, 7 months, and 19 days, at 7 per cent. per annum? *answer* 171*l* 2*s* 7*d.*

The interest of any sum, for any time, at 6 per cent. per annum, may also be found by this

RULE.

RULE.

Multiply the principal by half the time in months, and divide by 100.

Note 1. If there be days, take for them ſuch part or parts of the principal as half the days are of 30; deducting from the intereſt ſo found as many pence as there are threes in the pounds of thoſe parts excepting the units.

2. If the days exceed 30, bring them into months of 30 days each; deducting as above for the threes in the total.

3. To calculate intereſt on dollars at 6 per cent. for days multiply the ſum by the number of days, divide by 60; and the quotient will be the anſwer in cents.

4. For 7 per cent. to the intereſt at 6, add one ſixth.

8 What is the intereſt of 827*l* 18*s* 10*d.*½ for 1 year, 11 months, and 20 days, at 6 per cent. per annum?

M. *d.* *d.* | £. *s.* *d.*

23 20 10 = ⅓ | 827 8 10½

11½

11½ 10 half time.

9107 7 7½

½ = 413 19 5¼ = 97*l* 19*s* 5*d.*½

3) 27|5 19 7½ 9

£. 97|97 6 8¼ 97*l* 18*s* 8½

20 *anſwer.*

s. 19|46

12

d. 5|60

4

qr. 2|41

9 What ſum will 674*l* 13*s* 8*d.*¼ amount to, in 5 years, 11 months, and 28 days, at 6 per cent. per annum?

anſwer 917*l* 6*s* 1*d.*½

10 What is the intereſt of 517 dollars for 30 days, at 6 per cent. per annum? *anſwer* 2,58

11 What is the intereſt of 325 dollars, at 6 per cent. per annum, for 64 days? *anſwer* 3,46

12 At 6 per cent. what will the intereſt be of 100*l.* from

the 6th of the 7th month (July) to the ninth of the 1st month (January?) *answer* 3*l* 1*s* 9*d*.$\frac{1}{2}$

13 Tell the interest of 240*l*. for 1 year and 135 days, at 7 per cent. per annum? *answer* 23*l* 0*s* 3*d*.

14 What is the interest of 371*l*. for 1 year and 213 days, at 6 per cent. per annum? *answer* 35*l* 5*s* 0*d*.

15 What is the interest of a bond for 325*l* 15*s* 6*d*. for 1 year and 73 days, at 7 per cent. per annum?

answer 27*l* 7*s* 3*d*.$\frac{1}{2}$

16 Required the interest of a bond for 148*l* 12*s* 6*d*.$\frac{1}{2}$ for 11 months, at 6 per cent. per annum? *answer* 8*l* 3*s* 3*d*$\frac{1}{4}$

2

17 What sum will a bond of 333*l* 13*s* 3*d*.$\frac{3}{4}$ amount to in 17 months, at 6 per cent. per annum? *answer* 362*l* 0*s* 6*d*.$\frac{1}{2}$

18 A father left a legacy to his daughter of 651*l* 11*s*. to be at interest until she attained the age of eighteen; at his decease she was 15 years and 219 days old; what sum must she call on her executor for, interest computed at 7 per cent. per annum? *answer* 761*l* 0*s* 2*d*.$\frac{1}{2}$

19 What interest is due on a legacy of 517*l* 12*s* 8*d*.$\frac{1}{2}$ for 5 years, 11 months, and 25 days, at 6 per cent. per annum? *answer* 185*l* 17*s* 9*d*.

20 What is the interest of one farthing for 5794 years, at 7 per cent per annum? *answer* 8*s* 5*d*.$\frac{1}{4}$

21 A owes B the following sums, with the interest on them, at 6 per cent. per annum, viz. 60*l*. for 7 months; 150*l*. for 15 months; 75*l* 10*s*. for 9 months; 145*l* 15*s*. for 27 months, and 397*l* 12*s*. for 45$\frac{1}{2}$ months: what is the amount of the principal and interest? *answer* 955*l* 14 6*d*.$\frac{1}{2}$

CASE 4.

INSURANCE, COMMISSION and BROKAGE.

Insurance, commission and brokage, are allowances made to insurers, factors, or brokers, at a stipulated rate per cent.

RULE.

For the insurance, or commission, work as if to find the interest of the given sum, at the proposed rate for 1 year;

and, for the brokage, divide the sum by 100, and take such aliquot parts of the quotient, as the brokage is of a pound.

EXAMPLES.

1 A factor has disbursed upon his employer's ac[illegible]he sum of 1009*l* 18*s*. what must be demanded for his commission; at 2¼ per cent?

£. s. d. — £. s. d.
¼ | 1009 18 — *answer* 22 14 5¼
2
2019 16
252 9 6
£.22|72 5 6
20
s. 14|45
12
d. 5|46
4
qr. 1|84

2 What is the insurance of an East India ship and cargo, valued at 7406*l* 17*s* 6*d*. at 15¾ per cent?
answer 1166*l* 11*s* 7*d*.¾

3 Suppose 1¾ per cent. be allowed for commission; what must be demanded on 704*l*. 15*s* 4*d*.? *answer* 12*l* 6*s* 8*d*.

4 What is the brokage of 700*l* 14*s* 6*d* at 4*s*. per cent.
answer 1*l* 8*s* 0*d*.¼

5 What may a broker demand on 420*l* 12*s* 6*d* at 6*s* 4*d*. per cent? *answer* 1*l* 6*s* 7*d*.¼

6 The value of a ship and cargo is 85600dols. what is the insurance, at 35 per cent? *answer* 29960dols.

CASE 5.

To find the principal, when the amount, time and rate per cent. are given;

RULE.

RULE.

[illegible] amount of 100*l.* at the rate and time given,
[illegible] 100*l.*
So [illegible] the amount given,
To the principal required.

EXAMPLES.

1 What principal at interest for nine years, at 5 per cent. per annum, will amount to 725*l.*?

£.
5
9
—
45
100
—
As 145*l.* ·· 100*l.* :: 725*l.* ·· 500*l.* *answer.*

2 What sum at interest for 9 years and 6 months, at 4½ per cent. per annum, will amount to 856*l* 10*s.*? *ans.* 600*l.*

CASE 6.

To find the rate per cent. when the amount, time, and principal are given;

RULE.

As the principal,
Is to the Interest of the whole time;
So is 100*l.*
To its interest for the same time.
Divide the interest last found by the time, and the quotient will be the rate per cent.

EXAMPLES.

1 At what rate per cent. per annum, will 500*l.* amount to 725*l.* in 9 years?

£.
725
500
—
As 500*l.* ·· 225*l.* :: 100*l.* ·· 9) 45
—
answer 5 per cent.

2 At what rate per cent. will 600dols. amount to 856dols. 50cts. in 9 years and 6 months? *answer* 4½ per cent.

CASE 7.

To find the time, when the principal, amount and rate per cent. are given;

RULE.

Divide the whole interest by that of the principal for one year; and the quotient will be the time required.

EXAMPLES.

1 In what time will 500*l.* amount to 725*l.* at 5 per cent. per annum?

£.	£.
500	725
5	500
£. 25|00	25)225(9 years, *ans.*

2 In what time will 600*l.* amount to 856*l* 10*s.* at 4½ per cent. per annum? *answer* 9*y.* 6*m.*

3 A testator left his son, besides providing for his education, &c. 2000 dols. to receive the amount thereof at 5 per cent. when he should arrive at the age of 21 years, which his guardian then found [illegible] be 2925 dols. how old was the boy at his father's decease? *answer* 11 years, 9 months.

A TABLE.

A TABLE

For finding the Interest of any Sum of Money for any number of Months, Weeks, or Days, at any rate per cent.

Year.	Calen. Month.			Week.			Day.		
£.	£.	s.	d	£.	s.	d.	£.	s.	d.
1	0	1	8	0	0	4½	0	0	0¾
2	0	3	4	0	0	9	0	0	1¼
3	0	5	0	0	1	1¾	0	0	2
4	0	6	8	0	1	6½	0	0	2¾
5	0	8	4	0	1	11	0	0	3¼
6	0	10	0	0	2	3¾	0	0	4
7	0	11	8	0	2	8¼	0	0	4½
8	0	13	4	0	3	0¾	0	0	5¼
9	0	15	0	0	3	5½	0	0	6
10	0	16	8	0	3	10¼	0	0	6½
20	1	13	4	0	7	8¼	0	1	1¼
30	2	10	0	0	11	6½	0	1	7¾
40	3	6	8	0	15	4½	0	2	2¼
50	4	3	4	0	19	2¾	0	2	8¾
60	5	0	0	1	3	1	0	3	3½
70	5	16	8	1	6	11	0	3	10
80	6	13	4	1	10	9¼	0	4	4½
90	7	10	0	1	14	7½	0	4	11¼
100	8	6	8	1	18	5½	0	5	5¾
200	16	13	4	3	16	11	0	10	1[illegible]
300	25	0	0	5	15	4½	0	16	[illegible]
400	33	6	8	7	13	10	1	1	11
500	41	13	4	9	12	3¾	1	7	4¾
600	50	0	0	11	10	9	1	12	10½
700	58	6	8	13	9	2¾	1	18	4¼
800	66	13	4	15	7	8¼	2	3	10
900	75	0	0	17	6	1¾	2	9	3¾
1000	83	6	8	19	4	7½	2	14	9½
2000	166	13	4	38	9	2¾	5	9	7
3000	250	0	0	57	13	10	8	4	4½
4000	333	6	8	76	18	5½	10	19	2¼
5000	416	13	4	96	3	0¾	13	13	11¾
6000	500	0	0	115	7	8¼	16	8	9¼
7000	583	6	8	134	12	3¾	19	3	6¾
8000	666	13	4	153	16	11	21	18	4¼
9000	750	0	0	173	1	6½	24	13	1¾
10000	833	6	8	192	6	1¾	27	7	11¼
20000	1666	13	4	384	12	3½	54	15	10¾
30000	2500	0	0	576	18	5¼	82	3	10
40000	3333	6	8	769	4	7¼	109	11	9¼
50000	4166	13	4	961	10	9	136	19	8¾

To calculate interest by the preceding table;

RULE.

Multiply the sum by the rate per cent. and that product by the months, weeks or days given; then cut off the two last figures to the right hand, and enter the table with what remains to the left; against which numbers, collected, is the interest for the given sum.

Note. For every 10 cut off in months, add 2*d.* for every 20 in weeks, add 1*d.* and for every 40 in days, 1*qr.*

EXAMPLES.

1 What is the interest of 2466*l* 16*s* 6*d.* for 10 months, at 4 per cent. per annum?

£.	s.	d.
2466	16	6
		4
9867	6	0
		10
986|73	0	0

	£.	s.	d.
900=	75	0	0
80=	6	13	4
6		10	0
Add		1	2½
£.	82	4	6½ *answer.*

2 What is the interest of 2467*l* 10*s.* for 12 weeks, at 5 per cent. per annum?

£. s.
2467 10×5×12=1480|50

	£.	s.	d.
1000=	19	4	7½
400=	7	13	10
80=	1	10	9¼
Add			2½

answer 28*l* 9*s.* 5*d.*

3 What is the interest of 2467*l* 10*s.* for 50 days, at 6 per cent. per annum?

£.
2467 10×6×50=7402|50

	£.	s.	d.
7000=	19	3	6¾
400=	1	1	11
2=			[illegible]
Add			[illegible]

answer 20*l* 5*s* 7*d.*½

To find what any estate from 1*l.* to 50000*l.* per annum will be for a month, or a day;

RULE

RULE.

Collect the sums from the table opposite the given numbers for the answer.

EXAMPLES.

At 365*l.* per annum, what is that per day; also per month;

	s.	*d.*
300=	16	5¼
60=	3	3½
5=		3¼
£. 1	0	0 per day.

£.	*s.*	*d.*
25	0	0
5	0	0
	8	4
£. 30	8	4 per month.

To find the amount of any income, salary or servant's wages, for any number of months, weeks or days;

RULE.

Multiply the yearly income, or salary, by the number of months, weeks, or days, and collect as before from the table.

EXAMPLE.

What will 270*l.* per annum come to for 11 months, for 3 weeks, and for 6 days, separately and collectively?

	£.	*s.*	*d.*
270×11=2970	166	14	4
	75	0	0
	5	16	8
For 11 months	247*l*	10*s*	0*d.*
270×3=810	15	7	8¼
		3	10
For 3 weeks	15	11	6¼
270×6=1620	2	14	9½
	1	12	10½
		1	1
For 6 days	4	8	9

Collectively.

£.	*s.*	*d.*
247	10	0
15	11	6¼
4	8	9
267	10	3¼

A

A TABLE

Of Days for any given time less than a Year.

Days.	1st. Mon.	2d. Mon.	3d. Mon.	4th. Mon.	5th. Mon.	6th. Mon.	7th. Mon.	8th. Mon.	9th. Mon.	10th. Mon.	11th. Mon.	12th. Mon.
1	1	32	60	91	121	152	182	213	244	274	305	335
2	2	33	61	92	122	153	183	214	245	275	306	336
3	3	34	62	93	123	154	184	215	246	276	307	337
4	4	35	63	94	124	155	185	216	247	277	308	338
5	5	36	64	95	125	156	186	217	248	278	309	339
6	6	37	65	96	126	157	187	218	249	279	310	340
7	7	38	66	97	127	158	188	219	250	280	311	341
8	8	39	67	98	128	159	189	220	251	281	312	342
9	9	40	68	99	129	160	190	221	252	282	313	343
10	10	41	69	100	130	161	191	222	253	283	314	344
11	11	42	70	101	131	162	192	223	254	284	315	345
12	12	43	71	102	132	163	193	224	255	285	316	346
13	13	44	72	103	133	164	194	225	256	286	317	347
14	14	45	73	104	134	165	195	226	257	287	318	348
15	15	46	74	105	135	166	196	227	258	288	319	349
16	16	47	75	106	136	167	197	228	259	289	320	350
17	17	48	76	107	137	168	198	229	260	290	321	351
18	18	49	77	108	138	169	199	230	261	291	322	352
19	19	50	78	109	139	170	200	231	262	292	323	353
20	20	51	79	110	140	171	201	232	263	293	324	354
21	21	52	80	111	141	172	202	233	264	294	325	355
22	22	53	81	112	142	173	203	234	265	295	326	356
23	23	54	82	113	143	174	204	235	266	296	327	357
24	24	55	83	114	144	175	205	236	267	297	328	358
25	25	56	84	115	145	176	206	237	268	298	329	359
26	26	57	85	116	146	177	207	238	269	299	330	360
27	27	58	86	117	147	178	208	239	270	300	331	361
28	28	59	87	118	148	179	209	240	271	301	332	362
29	29	60	88	119	149	180	210	241	272	302	333	363
30	30		89	120	150	181	211	242	273	303	334	364
31	31		90		151		212	243		304		365

THE USE OF THE TABLE.

First, To know the number of days, from the beginning of the year, to any given day of any month:

This is obtained by inspection only.

Secondly, To find the number of days from any day in any month to the end of the year:

Suppose from 10th 9mo.

From - - - - -		365
Take the days answering to 10th 9mo.		253
Remains - - - - -	Days	112

Thirdly, To find the number of days between different dates:

Suppose the 9th of the 5th month, and the 5th of the 11th month.

From the number answering to 5th 11mo.		309
Take that of the 9th 5mo. -		129
Remains - - - - -	Days	180

Fourthly, To find the number of days from a given date, to some other in the year following:

Suppose, from 12th 10mo. to 10th 6mo. ensuing.

From - - - - - - -	365
Take the number answering to 12th 10mo.	285
	80
To which add the 10th 6mo. -	161
Days required - - - -	241

Note If the intercalary day of a leap year intervene, one day muſt be added to thoſe found as before.

COMPOUND INTEREST.

Compound interest is that which arises from a principal increased by its interest as the interest becomes due.

RULE.

RULE.

Find the first year's amount by simple interest, which will be the principal for the second year; and the amount of this will be the principal for the third year, &c.

From the last amount, take the given principal, and the remainder will be the compound interest.

EXAMPLES.

1 What is the compound interest of 450*l.* for three years, at 5 per cent. per annum?

	£.	s.	d.
Principal	450	0	0
Interest = $\frac{1}{20}$ =	22	10	0
Amount 1st. year	472	10	0
Interest = $\frac{1}{20}$ =	23	12	6
Amount 2d. year	496	2	6
Interest = $\frac{1}{20}$ =	24	16	1$\frac{1}{8}$
Amount 3d. year	520	18	7$\frac{1}{2}$
Principal	450		
answer £.	70	18	7$\frac{1}{2}$

2 What will 400*l.* amount to in 4 years, at 6 per cent. per annum? *answer* 504*l* 19*s* 9*d.*$\frac{1}{4}$

3 How much is the compound interest of 1280dols, for six years, at 5 per cent. per annum? *answer* 435,32,2 dols.

4 What will 500*l.* amount to in 4 years, at 4$\frac{1}{4}$ per cent. per annum? *answer* 590*l* 11*s* 5*d.*$\frac{1}{2}$

5 What is the compound interest of 400*l* 10*s.* at 3$\frac{1}{2}$ per cent. per annum for 3 years? *answer* 43*l* 10*s* 9*d.*$\frac{1}{4}$

REBATE, OR DISCOUNT.

REBATE, or Discount, is an abatement for the payment of money before due, by accepting so much, as would amount to the whole debt at the time payable, at a given rate.

RU

RULE.

As the amount of 100*l.* or dols. at the rate and time given,
Is to 100*l.* or dollars.
So is the whole debt
To the present worth: (*See case 5th Simple Interest.*)
Subtract the present worth from the whole debt, and the remainder will be the rebate.

PROOF.

Find the amount of the present worth for the time and rate proposed, which must equal the given sum.

Note. Rebate, or Diſcount, is not the intereſt of the ſum due (as ſome miſtake it) but of the preſent worth. See example 7.

EXAMPLES.

1 What is the rebate of 795*l* 11*s* 2*d.* for 11 months, at 6 per cent. per annum?

m. £. m. £. s.
As 12 .. 6 : : 11 .. 5 10
100 0

Amount 105 10

£. s. £. £. s. d. £. s. d.
As 105 10 .. 100 : : 795 11 2 .. 754 1 8

£. s. d.
795 11 2
754 1 8 present worth

41 9 6 Rebate, answer.

2 What is the present worth of 430dols. 67cts. for 19 months, discount at 5 per cent? *answer* 399,07cts.

3 Sold goods for 795*l* 11*s* 2*d.* to be paid 4 months hence; what is the present worth, at 3½ per cent? *answer* 786*l* 7*s* 8*d.*

4 What is the rebate of 112*l* 12*s* for 20 months, at 7 per cent? *answer* 11*l* 15*s* 3*d.*½

5 Sold goods for 832dols. one half to be paid at 3 months, and the other half at 6 months; what must be discounted for present payment, at 5 per cent? *answer* 15,28,5 mills.

6 What is the present worth of 100*l.* one half payable at 4 months, and the other at 8 months; discount at 5 per cent?

answer 97*l* 11*s* 4*d*.

7 What difference is there between the interest of 500dol. at 5 per cent. per annum, for 12 years, and the discount of the same sum, at the same rate, and for the same time?

answer 112,50

EQUATION.

EQUATION is the method of reducing several stated times, at which money is payable, to one mean, or equated time.

RULE.

Multiply each payment by its time, and divide the total of the products by the sum payable at the time required: the quotient will be the equated time.

PROOF.

The interest of the sum payable at the equated time, at any given rate, will equal the interest of the several payments for their respective times.

EXAMPLES.

1 A owes B 100*l.* of which 50*l.* are to be paid at 2 months, and 50*l.* at 4 months, but they agree to reduce them to one payment; when must the whole be paid?

$$50 \times 2 = 100$$
$$50 \times 4 = 200$$

1|00) 3|00

answer 3*M.*

2 A merchant has owing to him 300*l.* to be paid as follows, viz. 50*l.* at 2 months, 100*l.* at 5 months, and the rest at 8 months, but it is agreed to make one payment of the whole; when will that time be? *ans.* at 6 months.

3 F owes H 1000dol. of which 200dol. are to be paid present, 400dol. at 5 months, and the rest at 10 months, but they agree to make one payment of the whole, and wish to know the time? *ans.* 6 months.

4 C owes D a sum of money, which is to be discharged, viz. ¼ at 2 months, ⅓ at 4 months, ⅙ at 6 months, and ¼ at 8 months; but they agreeing to make one payment of the whole, the equated time is required? *answer* 5 months.

5 E is indebted to F 240dol. which by agreement is to be paid 5 months hence, but E is willing to pay him 40dol. present, provided he will give him longer time to pay the remainder, which is agreed on; the time of payment is therefore required? *answer* 6 months.

6 P owes Q 420*l.* which will be due 6 months hence, but P is willing to pay him 60*l.* present, provided he can have the remainder foreborne a longer time, to which Q agrees; the time of payment is required? *answer* 7 months.

BARTER.

BARTER is the exchanging of one commodity for another, by duly proportioning their quantities and values.

RULE.

Work by the Rule of Three direct, or inverse, or by Practice, as the tenor of the question may require.

EXAMPLES.

1 How much sugar at 9*d.* per *lb.* should be bartered for 6½ *C.wt.* of tobacco, at 14*d.* per *lb.*?

lb. *d.* *C.qr.* *d.*
As 1 .. 14 :: 6 2 .. 10192
d. *lb.* *d.* *C.qr.* *lb.*
Then, As 9 .. 1 :: 10192 .. 10 0 12$\frac{4}{9}$ answer.
Or thus,
d per.lb.C.qr. *d per.lb.C.qr.lb.*
Inverse. If 14 .. 6 2 : : 9 .. 10 0 12$\frac{4}{9}$

2 What quantity of tea, at 10*s.* per *lb.* must be given for 1 *C.wt.* of chocolate, at 4*s.* per *lb.*? *ans.* 44*lb.* 12*oz.* +

3 How much rice, at 28*s.* per *C.wt.* must be bartered for 3½*C.* of raisins, at 5*d.* per *lb.*? *ans.* 5*C.* 3*qr.* 9*lb.* +

4 A has linen cloth worth 20cts. an ell, ready money, but in barter he will have 25cts. B has broad cloth worth 2 dols. per yard, ready money; at what price ought the broad cloth to be rated in barter? *answer* 2,50cts.

5 Suppose C has tea at 8*s* 5*d.* per *lb.* ready money, but in barter he will have 10*s.* per *lb.* D has tobacco worth 18*d.* [illegible]. ready money; how must he rate his tobacco per *lb.* [illegible]al the tea in value? *answer* 1*s* 9*d.*+

[illegible] has nutmegs worth 1 dol. per pound, ready money, but in barter will have 106 cts. per pound, D has tobacco worth 10 cts. per *lb.* ready money; how must D rate his tobacco, that his profits may be equivalent with A's?

answer 106 mills.

7 A had 41*C.wt.* of iron, at 30*s.* per *C.wt.* for which B gave him 20*l.* in money, and the rest in pork, at 5*d.* per *lb.* how much pork must be given besides the 20*l.*?

answer 19[illegible]*lb.*

8 A has 320 dozens of candles, at 1,20cts. per dozen, for which B agrees to pay him 160dols. in cash, and the rest in cotton at 20cts. per pound, how much cotton must B give A?

answer 1120*lb.*

9 K has 75 sheep at 14*s* 6*d.* each, for which L is to give him 17*l* 12*s.* and the rest in Indian corn, at 3*s* 6*d.* per bushel; how much corn must L give K? *ans.* 210*bu.* 4*qt.*

10 A and B bartered; A had 5*C.* of sugar, at 6*d.* per pound, which he gave to B for a quantity of cinnamon, at 10*s* 8*d.* per pound, how much cinnamon did B give A?

answer 26*lb.* 4*oz.*

11 B delivered 3 hogsheads of brandy at 6*s* 8*d.* per gallon, to C, for 126 yards of cloth; what was the cloth per yard?

answer 10*s.*

12 C has candles at 12*s.* per dozen, ready money, but in barter he will have 13*s.* per dozen. D has cotton at 18*d.* per pound, ready money; what price must the cotton be at in barter, and how much must be bartered for 100 dozen of candles?

answer the cotton at 19*d.*½ per pound, and 860*lb.* must be given for 100 dozen candles.

13 A has linen at 10*d.* the ell, ready money, but in barter 1*s.* B has 3610*lb.* of sugar at 7*d.*½ per *lb.* ready money, and will have of A 35*l.* in cash, and the rest in linen; at what rate is the sugar in barter, and how much linen must A give B? *answer* the sugar 9*d.* and 1867½ ells.

14 Two merchants barter; A receives 20*C.wt.* of cheese, at 21*s* 6*d.* per *C.wt.* B 8 pieces of linen, at 3*l* 14*s.* per piece; which of them must receive money, and how much? *answer* A 8*l* 2*s.*

15 If 24 yards of cloth be given for 5*C.* 1*qr.* of tobacco, at 1*l* 18*s.* per *C.wt.* what is the cloth rated at per yard? *answer* 8*s* 3*d.*¾

16 A barters 40 yards of cloth at 7*s* 4*d.* per yard, with B, for 28½*lb.* of tea, at 11*s* 6*d.* per pound; which must pay balance, and how much? *answer* A 1*l* 14*s* 5*d.*

17 A has 7½ *C.wt.* of sugar, at 8*d.* per pound, for which B gave him 12½*C.wt.* of cheese; what was the cheese rated at per pound? *answer* 4*d.*¾

18 What quantity of sugar, at 8*d* per *lb.* must be given in barter for 20*C.wt.* of tobacco, at 3*l* per hundred weight? *answer* 16*C.wt.* 8*lb.*

19 P has coffee which he barters with Q at 10*d.* per *lb.* more than it cost him, against tea, which stands Q in 10*s.* the *lb.* but puts it at 12*s* 6*d.* query the prime cost of the coffee? *answer* 3*s* 4*d.*

20 A and B barter; A has 12½ *C.wt.* of hops, at 2*l* 16*s.* per C.wt. but in barter insists on 3*l.* B has wine worth 5*s.* a gallon, which he raises in proportion to A's demand: on the balance, A received but a *hhd.* of wine; what had he in ready money? *answer* 20*l* 12*s* 6*d.*

LOSS AND GAIN.

LOSS and Gain is a method of computing the profit or loss on the purchase or sale of goods, &c.

RULE.

Work by the Rule of Three, or by Practice, as the nature of the question may require.

EXAMPLES.

1 Bought 18*C.* of iron, at 28*s.* per hundred, and retailed it at 3*d.*½ per pound; what is gained in the whole?

C. *s.* *C.* *£.* *s.*
If 1 .. 28 :: 18 .. 25 4 Prime cost.
18*C.*=2016*lb* at 3*d.*½=29*l* 8*s.* sold for
29*l* 8*s.* 25*l* 4*s.*=4*l* 4*s.* *answer.*

2 Bought k[illegible]s for 20cts. each, and sold them at 1 each; how much is lost by the sale of 120 dozen?

answer 43,2

3 Hats bought at 4*s*. a piece, and sold at 4*s* 9*d*. is the gain per cent? *answer* 18*l*

4 Bought 7 tuns of wine, at 17*l*. per *hhd*. and sold 1*s*. per pint, what is the whole gain, and the gain per

answer whole gain 229*l* 12*s*. per cent. 48*l* 4*s*

5 A draper bought 100 yards of cloth for 149 dols. must he sell it per yard, to gain 54 dols. in the whole?

answer 2 dols. per

6 Bought 60 reams of paper, at 2 dols. per ream; wl lost in the whole quantity, at 4 per cent?

answer 4,8

7 Sold 500 penknives, at 15*d*. a piece, and 9 per lost; what is lost in the whole number?

answer 3*l* 1*s*

8 Paid 69*l*. for 1 ton of steel; what is the profit o on the sale of 14 tons retailed at 6*d*. per pound?

answer 182*l*.

9 If a yard of cloth be bought for 13*s* 4*d*, and sol 16*s*. what is the gain per cent? *answe*

10 If 1*C*. of tobacco be bought for 4*l* 13*s* 4*d*. an at 11*d*. per pound, what is the gain or loss per cent?

answer 10*l*.

11 A draper bought 100 yards of cloth for 56*l*. must he sell it per yard, to gain 15*l*. per cent?

answer 12*s*

12 Sold 12 yards of cloth for 5*l* 14*s*. by which was ed 8*l*. per cent. what was the prime cost of a yard?

answer 8*s* 9

13 Having bought a parcel of goods for 18*l*. and the same immediately for 25*l* with 4 months credit is gained per cent. per annum? *answer* 116*l* 1

14 Bought 300*lb*. of coffee at 4*s* 2*d*. per *lb*. ready and sold it at 5*s* per pound, payable in 8 months; how was gained on the whole, allowing discount at 6 pe and how much per cent. per annum?

answer $\begin{cases} 9l\ 12s\ 3d.\frac{1}{2} \text{ who} \\ 30 \qquad\quad \text{per} \end{cases}$

15 If, when cloth is sold at 7*s*. per yard, there is 10 per cent. what will be the gain per cent. when it for 8*s* 6*d*. per yar *answer* 33*l* 11

16 Bought a chest of tea, weighing 4[illegible]. for 326 dols. and sold it for 370,10cts. what was the profit on each *lb.* *answer* 9cts.

17 Bought 12 pieces of white cloth, for 6*l* 10*s.* per piece, paid 20*s* 10*d* a piece for dying; for how much must I sell them each, to gain 20 per cent? *answer* 9*l* 1*s.*

18 If 28 pieces of stuff be purchased at 4*l.* per piece, and 10 of them sold at 6*l.* and 8 at 5*l.* per piece; at what rate must the rest be disposed of, to gain 10 per cent. by the whole? *answer* 2*l* 6*s* 4*d.*$\frac{4}{5}$

19 Sold a yard of cloth for 11*s* 6*d.* by which was gained at the rate of 15 per cent. but, if it had been sold for 12*s.* what would have been the gain per cent? *answer* 20*l.*

20 If, when cloth is sold at 7*s.* a yard, the gain is 10*l.* per cent. what is the gain or loss per cent. when it is sold at 6*s.* a yard? *answer* 5*l* 14*s* 3*d.*$\frac{3}{7}$ loss.

21 At 1*d.*$\frac{1}{2}$ per shilling profit, how much per cent? *answer* 12*l* 10*s.*

22 At 3*s* 6*d.* in the pound profit, how much per cent? *answer* 17*l* 10*s.*

23 If by selling 1*lb.* of pepper for 10*d.*$\frac{1}{2}$ there is 2*d.* lost, how much is the loss per cent? *answer* 16*l.*

24 A merchant received from Lisbon 180 casks of raisins, which stand him here in 16*s.* each; and by selling them at 28*s.* per Cwt. he gains 25 per cent. required the weight of each cask, one with another? *answer* 80*lb.*

FELLOWSHIP.

FELLOWSHIP is the rule for adjusting the several quotas of the loss or gain on any joint adventure, or of a bankrupt's effects, &c.

CASE 1.

When the several stocks in company are considered without regard to time;

Rule.

As the whole sum, or stock,
Is to the whole gain, or loss;
So is each partner's share in stock, &c.
To his quota of the gain, or loss.

PROOF.

PROOF.

The sum of the several shares must equal the whole gain, or loss.

EXAMPLES.

1 Three merchants traded: A put in 140dols. B 300dol. and C 160dols. their gain was 120dols. what is each man's share thereof?

A 140
B 300 As 60[illegible] 120 :: $\left\{\begin{array}{l}140 \,..\, 28 \text{ A's share.}\\ 300 \,..\, 60 \text{ B's share.}\\ 160 \,..\, 32 \text{ C's share.}\end{array}\right\}$ *answer*
C 160

Dols. 600 Dols. 120 Proof.

2 Three merchants trading to Virginia, lost goods to the value of 800*l.* now suppose A's stock was 1200*l.* B's 4800*l.* and C's 2000*l.* what sum must each man sustain of the loss?

answer A 120*l.* B 480*l.* C 200*l.*

3 A, B and C, freighted a ship with 108 tuns of wine, of which A had 48 tuns, B 36, and C 24, but by reason of stormy weather were obliged to cast 45 tuns overboard; how much must each man sustain of the loss?

answer A 20, B 15, and C 10 tuns.

4 Suppose a merchant is indebted to S 70*l.* T 400*l.* V 140*l* 12*s* 6*d.* but upon his death his estate is found to be worth only 409*l* 14*s.* how must it be divided among his creditors? *answer* S must have 46*l* 19*s* 3*d.*$\frac{3}{4}$, T 268*l* 7*s* 7*d.*$\frac{1}{4}$, V 94*l* 7*s* 9*d.*$\frac{1}{2}$

5 If the money and effects of a bankrupt amount to 1400*l* 14*s* 6*d.* and he is indebted to A 742*l* 12*s.* to B 641*l* 19*s* 8*d.* and to C 987*l* 19*s* 9*d.* how must it be divided among them? *ans.* A must have 438*l* 8*s* 4*d.*$\frac{1}{4}$, B 379*l* 3*d.*$\frac{3}{4}$, C 583*l* 5*s* 9*d.*$\frac{3}{4}$

6 Three graziers, A, B and C, rent an estate, containing 292 acres, 3 roods, 17 perches, at 200*l.* per annum; of which A pays 60*l.* B 65*l.* and C 75*l.* they have agreed that the estate shall be divided in proportion to the rents; what is each man's dividend?

		A.	*R.*	*P.*
answer	A's share	87	3	17
	B's	95	0	28
	C's	109	3	11

7 P, Q and R, rent an estate, containing 360 acres, at 240*l.* per annum: of which P holds 90, Q 120, and R 150 acres; what must each man pay, in proportion to the land he holds?

answer { P. 60*l.*
Q 80*l.*
R 100*l.*

CASE 2.

When the respective stocks in company are considered with time;

RULE.

Multiply each man's stock by its time; then,
As the sum of the products
Is to the whole gain, or loss;
So is each particular product
To its share of the gain, or loss.

EXAMPLES.

1 Three merchants traded together: A put in 120*l.* for 9 months, B 100*l.* for 16 months, and C 100*l.* for 14 months, and they gained 100*l.* what is each man's quota?

	£.	m.
A	120×	9=1080
B	100×	16=1600
C	100×	14=1400

Sum 4080

Sum.	£.	*Sum.*	£.	s.	d.	q.			
As 4080 ··	100	1080 :	: 26	9	4	3	$\frac{3120}{4080}$	A's	answer.
		1600 :	: 39	4	3	3	$\frac{240}{4080}$	B's	
		1400 :	: 34	6	3	1	$\frac{720}{4080}$	C's	
			100	0	0	0	Proof.		

2 Three merchants in a joint adventure put in as follow: A 400*l.* for 9 months, B 680*l.* for 5 months, and C 120*l.* for 12 months? but by misfortune lost goods to the value of 500*l.* what must each sustain of the loss? *ans.* A must lose 213*l* 5*s* 4*d.*¼, B 201*l* 8*s* 5*d.* and C 85*l* 6*s* 1*d.*¾

3 A, B, and C, hold a pasture in common, for which they pay 20*l.* per annum; in this pasture A had 40 oxen for 76 days, B 36 for 50 days, and C 50 for 90 days; what part of the 20*l.* must each of them pay? *ans.* A must pay 6*l* 10*s* 2*d.*¼, B 3*l* 17*s* 1*d.* C 9*l* 12*s* 8*d* ¼

4 A put in stock 1800 dols B advanced 4 months after; required the sum he put in, so as at the year's end to claim equal profits with A? *answer* 2700 dols.

5 A, B, and C join stocks for 12 months; A puts in 100*l.* and the first of the fifth month 150*l.* more; and on the first of the ninth month takes out 30*l.* B puts in 250*l.* on the first of the sixth month 60*l.* more; and on the first of the eleventh month 100*l.* more; C puts in 300*l.*; on the first of the fourth month takes out 200*l.* and on the first of the eighth month takes out 50*l.* more; the whole gain is 133*l.* what is each partner's proper share of it?

answer A must have 40*l* 14*s* 0*d.*¾ B 64*l* 12*s* 6*d.* C 27*l* 13*s* 5*d.*

6 A, B, and C made a stock for 12 months; A put in at first 364*l.* and four months after he put in 40*l.* more; B put in at first 408*l.* and at the end of 7 months he took out 86*l.* C put in at first 148*l.* and three months after he put in 86*l.* and 5 months after that he put in 100*l.* more; and at the end of 12 months, their gain is found to be 1436*l.* what is each man's share thereof? *answer* A 556*l* 3*s* 6*d.*½, B 529*l.* 16*s* 9*d.*¼, C 349*l* 19*s* 8*d.*

7 A, B, and C join in company: A's stock is 50*l.* for 12 months, B's 160 yards of cloth 8 months, and C's 240 bushels of wheat 7 months; their gain is such, that A and B's share is 456*l.* B and C's 431*l.* C and A's 375*l.*—Required the whole gain; each one's respectively; the price of B's cloth per yard, and what C's wheat was per bushel?

answer whole gain 631*l.* A's share 200*l.* B's 256*l.* and C's 175*l.* B's cloth 12*s.* per yard, and C's wheat 6*s* 3*d.* per bushel.

EXCHANGE.

EXCHANGE is the rule, by which the money, &c. of one state or country, is reduced to that of another.

Par is equality in value, but the course of exchange is frequently above, or below par.

Agio is a term used to signify the difference, in some countries, between bank and current money.

CASE 1.

Exchange between the United States.

RULE.

As dollars rate from state to state,
Make other coins proportionate.

Or,—Work by the theorem in the following table, oppo-te to the State of which the given sum is, and under that to hich it is to be reduced.

PROOF.

Vary the operation, or prove one of these methods by the her.

A TABLE.

Exhibiting the value of a Dollar in each of the United States; and practical Theorems for exchanging the currency of either, into that of any other.

To exchange from ... to	*N. Engl. States & Virgina,*	*Pennsylvani. Jer. Dela. & Marylan.*	*New York and N. Carolina.*	*S. Carolina and Georgia.*
* New England States and Virginia,	Dollar 6/0	Add one 4th	Add one 3d.	Subtract $\frac{1}{9}$ twice.
Pennsylvnia, N. Jersey, Delaware and Maryland	Subtract one 5th.	Dollar 7/6	Add one 15th.	× 3 $\frac{1}{9}$, & ÷ 5
New York and North Carolina,	Subtract one 4th.	Subtract one 16th,	Dollar 8/0	To $\frac{1}{2}$ add $\frac{1}{6}$ of the $\frac{1}{2}$
South Carolina and Georgia,	Add two 7ths.	Add $\frac{1}{2}$ $\frac{1}{7}$ that $\frac{1}{2}$ & $\frac{1}{2}$ that $\frac{1}{7}$	× 2 & Sub. $\frac{1}{7}$ Product.	Dollar 4/8

* The New England States are, New Hampshire, Massachusetts, Rhode Island, and Connecticut.

ote. The value of a dollar in any ſtate is found, either oppoſite to hat ſtate, or under it in the table.

EXAMPLES.

1 What is the value of 420*l.* South Carolina currency, in New York?

s.	*d.*	*s.*	£.	£.
As 4	8 :	8 ::	420 :	720 *answer*

Or, £. 420
2
⅐)840
120
£. 720 Proof.

2 What is the value of a bill of 750*l.* Pennsylvania, or other like currency, in New York, or North Carolina currency? *answer* 800*l.*

3 What sum of New York currency is equal to 173*l* 16*s.* in New Jersey? *answer* 185*l* 7*s* 8*d.*¼

4 Philadelphia 28th, 12mo. 1810.

Exchange for 375*l.* Pennsylvania currency.

Thirty days after sight, pay to Charles Jackson, or order, three hundred seventy-five pounds, Pennsylvania currency, as per advice from thy friend,

Peter Simpson.

Stivers
To Stivers Brown,
Merchant, Virginia.

How much Virginia currency will discharge the above bill? *answer* 300*l.*

5 B, of Massachusets, received in Pennsylvania currency, the following sums, viz. 76*l* 17*s* 8*d.*—200*l.*—and 170*l.* 10*s* 11*d.* What sum is equal thereto in the state he resides in? *answer* 357*l* 18*s* 10*d.*½

6 How much South Carolina currency is equal to 1500*l.* of New Jersey? *answer* 933*l* 6*s* 8*d.*

7 A merchant in New York owes 240*l* to a planter in Virginia; how much ought he to be charged with in the planter's books? *answer* 180*l.*

8 New-York, 4th 1mo. 1810

Exchange for 562*l* 13*s* 8*d.*

Twelve days after sight please to pay to David Davis, or order, five hundred and sixty-two pounds, thirteen shillings, and eight pence, value received; and place the same to account, as per advice from thy friend,

Issac Jones.

To Bradshaw Waters.

What sum, Georgia currency, will discharge this bill?

answer 328*l* 4*s* 7*d.*½

9 C, of Connecticut, draws on D. of Delaware, for 104*l.* 16*s* 9*d.* what sum in the latter currency will pay this draught? *answer* 131*l* 0*s* 11*d.*¼

10 What sum, New-York currency, is equal to 180*l.* in Massachusets? *answer* 240*l.*

11 How much South Carolina currency is equal to 360*l.* Massachusets money? *answer* 280*l.*

12 A Bill of exchange for 475*l.* being remitted from Georgia to New-Jersey; what is the value of it in Jersey currency? *answer* 763*l* 7*s* 10*d.*¼

13 If 472*l* 16*s* 8*d.* be transmitted from Georgia to North Carolina; what sum is it equal to in the latter state? *answer* 810*l* 11*s* 5*d.*¼

14 How much Virginia currency will purchase a bill for 280*l.* South Carolina currency? *answer* 360*l.*

15 What is 96*l* 16*s* 9*d.*¾ of Charleston, South Carolina, worth in New-York? *answer* 166*l* 0*s* 3*d.*

16 Reduce 36791*l* 14*s* 4*d.* of New-York to New-Jersey currency. *facit* 3 [illegible] 8*d.*¼

CASE 2.

FOREIGN EXCHANGE.

Accounts are kept in England, Ireland, and the West India Islands, in pounds, shillings, pence, and farthings: though their intrinsic values, in these places, are different.

A TABLE

A TABLE of different MONIES.

FRANCE.

12 Deniers = 1 Sol,
20 Sols = 1 Livre,
3 Livres = 1 Crown.

SPAIN.

4 Marvadies Vellon, or
2⅛ Marvadies of Plate } = 1 Quarta,
8½ Quartas, or
34 Marvadies Vellon, } = 1 Rial Vellon,
16 Quartas, or
34 Marvadies of Plate } = 1 Rial of Plate,
8 Rials of Plate = 1 Piastre, Pezo, or Dollar,
5 Piastres = 1 Spanish Pistole,
2 Spanish Pistoles = 1 Doubloon.

ITALY.

12 Deniers = 1 Sol,
20 Sols = 1 Livre,
5 Livres = 1 Piece of Eight at Genoa,
6 Livres = 1 Ditto at Leghorn,
6 Solidi = 1 Gross,
24 Grosses = 1 Ducat.

PORTUGAL.

400 Reas = 1 Crusadoe,
1000 Reas = 1 Millrea.

HOLLAND.

8 Pennings = 1 Groat,
2 Groats = 1 Stiver = 2*d.*
6 Stivers = 1 Shilling,
20 Stivers = 1 Florin, or Guilder,
2½ Florins = 1 Rix dollar,
6 Florins = 1 £. Flemish,
5 Guilders = 1 Ducat.

DENMARK.

16 Shillings = 1 Mark,
6 Marks = 1 Rix Dollar
32 Rustics = 1 Copper Dollar,
6 Copper Dollars = 1 Rix Dollar,

RUSSIA.

18 Pennins = 1 Gros,
30 Gros = 1 Florin,
3 Florins = 1 Rix Dollar,
2 Rix Dollars = 1 Gold Ducat,

RULE.

The various operations, in the exchanging of monies, are performed by the single Rule of Three, or by Practice.

Note. The par of Exchange between the United States of America and most other trading countries, may be ascertained by the tables in page 13.

EXAMPLES.

1 Philadelphia is indebted to London 1474*l* 16*s* currency; what sterling sum must be remitted, when the exchange is at 64 per cent?

$$\begin{array}{lllllll}
 & £. & £. & £. & s. & & \\
\text{As} & \cancel{164} : & \cancel{100} :: & 1474 & 16 & & \\
 & \overline{\ 41\ } & \overline{\ 25\ } & & 5 & & \\
 & & & \overline{7374} & \overline{0} & & \\
 & & & & 5 & & \\
 & & & & £. & s. & d. \\
 & & 41) & \overline{36870} & 0)\underline{899} & \underline{5} & \underline{4\tfrac{1}{4}}\ \textit{answer.}
\end{array}$$

2 London receives a bill of exchange from Philadelphia, for 943*l* 17*s* 5*d*.¼ sterling; for how much currency was it drawn, exchange being at 64 per cent?

$$\begin{array}{|r|c|rrr}
£. & & £. & s. & d. \\
50 & \tfrac{1}{2} & 943 & 17 & 5\tfrac{1}{4} \\
10 & \tfrac{1}{5} & 471 & 18 & 8\tfrac{1}{2} \\
2 & \tfrac{1}{5} & 94 & 7 & 8\tfrac{1}{4} \\
2 & \tfrac{1}{5} & 18 & 17 & 6\tfrac{1}{2} \\
 & & 18 & 17 & 6\tfrac{1}{2} \\
\hline
\multicolumn{2}{r}{\textit{answer } £.} & \underline{1547} & \underline{18} & \underline{11\tfrac{1}{2}}\ \text{Currency.}
\end{array}$$

3 Jamaica is indebted to London 1470*l* 12*s* 8*d*. sterling; with how much currency will London be credited at Jamaica, when the exchange is at 36½ per cent?

answer 2007*l*. 8*s* 3*d*.¼

4 Dublin draws upon London for 740*l* 14*s* 6*d*. Irish, exchange at 12 per cent. how much sterling will discharge this bill?

answer 661*l* 7*s* 2*d* ¾

5 London remits to Ireland 651*l* 14*s* 11*d*.¾ sterling; how much Irish must London be credited, exchange at 12 per cent? *answer* 729*l* 19*s* 2*d*.

6 Philadelphia, 20th 2mo. 1810.

Exchange for 452*l* 10*s* 6*d*. sterling.

Thirty days after sight of this my first of exchange, second and third of like tenor and date not paid, pay to Samuel Sims, or order, four hundred fifty-two pounds, ten shillings and six pence sterling, value received; and place the same to account, as per advice from

Peter Simpson.

Samuel Pimm, Merchant,
London.

What is the value of this bill in Pennsylvania currency, exchange at 77½ per cent? *answer* 803*l* 4*s* 7*d*.½

7 In a settlement between C of Philadelphia, and D of London, C is indebted 750*l* 2*s* 4*d*.½ sterling; what sum Pennsylvania currency is equivalent, exchange at 78 per cent? *answer* 1335*l* 4*s* 2*d*.½

8 How much sterling is equal to 1341*l* 9*s* 4*d*.¾ Pennsylvania currency, exchange at 67½ per cent?

answer 800*l* 17*s* 6*d*.½

9 What sum sterling will be equal to 260*l* 8*s* 6*d*. Virginia currency, exchange at 44 per cent? *answer* 180*l* 17*s*.

10 Purchased in Ireland effects to the value of 400*l* 17*s* 9*d*. of that place; what sum, Pennsylvania currency, will discharge the debt, exchange at 51½ per cent?

answer 607*l* 6*s* 10*d*.½

11 Philadelphia, 2d 3mo. 1810.

Exchange for 4226 livres, 12 sols. 8 deniers.

Thirty days after sight of this my second of Exchange, first of the same tenor and date not paid, pay to Thomas Broker, or order, four thousand two hundred and twenty-six livres, twelve sols, and eight deniers, value received; and place the same to account, as per advice from

Silas Stroud.

To Thomas Lamott,
Merchant, London.

How much sterling is the above bill, at 10*d*.½ per livre? And what sum in Pennsylvania currency, at 17*d*.½ per livre?

	£.	s.	d.	
answer	184	18	3¼	Sterling.
	308	3	10	Currency.

12 A Connecticut merchant imported goods from France, amounting, per invoice, to 49008 livres; how much currency of that state, at 15*d*. per livre, will they amount to; and how much sterling will discharge the debt, exchange being at par?

	£.	s.	d.	
answer	3063	0	0	Currency.
	2297	5	0	Sterling.

13 A merchant in Holland being desirous to turn 4376 florins currency into banco, the agio at 4 per cent. how many pounds Flemish banco must he receive?

answer 701*l*. 1*fl* 13*sti*. 13*pen*.

14 P, of Philadelphia, receives of A, of Amsterdam, an invoice of goods amounting to 10235*flo*. 17*sti*. 8*pen*. how much Pennsylvania currency, must be remitted to discharge the bill, at 35*d*.¾ per florin? And what is the sum in sterling, exchange at 38*s* 6*d*. Flemish per £. sterling?

	£.	s.	d.	
answer	1503	7	10½	Currency.
	886	4	5½	Sterling.

15 A bill for 2524 pezos, 7 ria. 33 marv. being remitted to Cadiz: what sum, Pennsylvania currency, is equal thereto, at 7*s* 6*d*. per pezo? *answer* 946*l* 17*s* 5*d*.½

16 A Virginia merchant sent goods to Norway, worth 1743*l* 16*s*. Virginia currency; how many rix dollars, at 6*s*. each, must he receive? *answer* 5812 dols. 4*s*.

17 A merchant of North Carolina shipped a quantity of flour, which, when disposed of, amounted to 1186 millreas, 500 reas: and received in return 17 pipes of wine, what was it per pipe, a millrea reckoned at 7*s* 6*d*.

answer 26*l* 3*s* 5*d*.¼

18 In 2714 guilders, 15 stivers, how many pounds sterling; exchange at 35*s* 6*d*. Flemish per £. sterling?

answer 254*l* 18*s* 1*d*.¼

19 In 290*l* 11*s* 10*d*. sterling, how many pounds Flemish; exchange at 33*s* 10*d*. Flemish per £. sterling, and agio at 4½ per cent? *answer* 513*l* 14*s* 1*d*.

20 London is indebted to Genoa in 1710*l* 16*s* 4*d*.; for how many pezos may Genoa draw on London, the exchange at 47*d*.$\frac{1}{2}$ per pezo? *answer*. 8644+

21 How many millreas will 1566*l* 6*s* 8*d*. amount to, exchange at 64*d*. per millrea? *answer* 5873 millreas, 750 reas.

22 A merchant in Rotterdam remits 564*l* 10*s* 6*d* Flemish to be paid in London; how much sterling money must he draw for, exchange at 34*s* 4*d*. per £. sterling?

answer 328*l* 16*s* 11*d*.$\frac{3}{4}$

23 Amsterdam changes on London 34*s* 3*d* per £ sterling, and on Lisbon, 52*d*. Flemish, for 400 reas; how then ought the exchange to go between London and Lisbon?

answer 75*d*.$\frac{3}{4}$ sterling nearly, per millrea.

24 A, at Paris, draws on B, of London, for 1200 crowns at 55*d*. sterling per crown; for the value whereof, B draws again on A, at 56*d*. sterling per crown; besides commission $\frac{1}{2}$ per cent. what did A gain or lose by this transaction?

answer A gained 15$\frac{1}{2}$+crowns.

VULGAR FRACTIONS.

A VULGAR FRACTION is a part, or parts of an integer, and is noted thus, $\frac{1}{8}$, one-eighth; $\frac{7}{8}$, seven-eighths. The upper number is called the numerator, and shews the part, or parts, expressed by the fraction; the lower number is called the denominator, and denotes the number of such parts contained in a unit.

Vulgar fractions are either proper, improper, compound, or mixt.

A proper fraction is one of which the numerator is less than the denominator; thus, $\frac{3}{8}$; $\frac{11}{12}$.

An improper fraction is one of which the numerator is equal to, or greater than, the denominator; thus, $\frac{8}{8}$, $\frac{8}{5}$.

A compound fraction is, a fraction of a fraction; as, $\frac{1}{3}$ of $\frac{5}{6}$ of $\frac{7}{8}$, &c.

A mixt number consists of a whole number and a fraction; as, $7\frac{2}{3}$.

A mixt fraction has a fraction annexed either to its numerator or denominator; as, $\frac{4\frac{7}{8}}{19}$ or $\frac{73}{131\frac{2}{5}}$

REDUCTION

REDUCTION OF VULGAR FRACTIONS.

CASE 1.

To reduce a fraction to its lowest terms ?

RULE.

Divide the greater term by the less, and that divisor by the remainder, till nothing be left ? the last divisor will be the common measure; by which divide both terms, for the fraction required: or,

Take the aliquot parts of both terms continually, till in their lowest terms.

Note. If the common meaſure be 1, the fraction is already in its loweſt terms. Ciphers to the right hand of both terms may be rejected, thus, $\frac{700}{800}=\frac{7}{8}$.

EXAMPLES.

1 Reduce $\frac{48}{56}$ to its lowest terms.

Or,

$$2)\quad 4)\qquad\qquad 48)56(1 \qquad 8)\tfrac{48}{56}=\tfrac{6}{7}\ \textit{facit.}$$

$$\tfrac{48}{56}=\tfrac{24}{28}=\tfrac{6}{7}\ \textit{facit.}\qquad \underline{48}$$

$$\text{Com. measure } 8)48(6$$

$$\underline{48}$$

$$0$$

2 Reduce $\frac{72}{94}$ to its lowest terms *facit.* $\frac{36}{47}$

3 Reduce $\frac{84}{170}$ to its lowest terms. $\frac{42}{85}$

4 Reduce $\frac{60}{125}$ to its lowest terms. $\frac{12}{25}$

5 Reduce $\frac{182}{196}$ to its lowest terms. $\frac{13}{14}$

6 Reduce $\frac{10976}{87808}$ to its lowest terms. $\frac{1}{8}$

CASE 2.

To reduce several fractions to others, retaining the same value, and to have one common denominator;

RULE.

Reduce the given fractions to their lowest terms: then multiply each numerator into all the denominators but its own, for its respective numerator; and all the denominators into each other, for a common denominator.

Note. This caſe, and caſe 1, prove eachother.

EXAMPLES.

1 Reduce $\frac{7}{8}$, $\frac{9}{10}$ and $\frac{11}{12}$ to a common denominator.

$$\left.\begin{array}{r} 7\times10\times12=840 \\ 9\times\ 8\times12=864 \\ 11\times\ 8\times10=880 \end{array}\right\}\text{Numerators.}$$

$8\times10\times12=960$ Denominator. *facit* $\left\{\frac{840}{960}, \frac{864}{960}, \text{ and } \frac{880}{960}.\right.$

2 Reduce $\frac{6}{10}$, $\frac{4}{8}$, $\frac{1}{9}$ and $\frac{6}{7}$ to a common denominator.

facit $\frac{378}{630}$, $\frac{315}{630}$, $\frac{70}{630}$ and $\frac{540}{630}$

3 Reduce $\frac{4}{9}$, $\frac{7}{11}$, $\frac{6}{7}$ and $\frac{1}{2}$ to a common denominator.

facit $\frac{616}{1386}$, $\frac{882}{1386}$, $\frac{1188}{1386}$ and $\frac{693}{1386}$

4 Reduce $\frac{6}{9}$, $\frac{2}{7}$, $\frac{1}{3}$ and $\frac{7}{8}$, to a common denominator.

facit $\frac{336}{504}$, $\frac{144}{504}$, $\frac{168}{504}$ and $\frac{441}{504}$

5 Reduce $\frac{4}{5}$, $\frac{1}{2}$, $\frac{5}{6}$ and $\frac{2}{8}$, to a common denominator.

facit $\frac{192}{240}$, $\frac{120}{240}$, $\frac{200}{240}$ and $\frac{60}{240}$

CASE 3.

To reduce a mixt number to an improper fraction;

RULE.

To the product of the whole number with the denominator, add the numerator, for a new numerator, under which place the given denominator.

EXAMPLES.

1 Reduce $12\frac{15}{17}$ to an improper fraction.

$12\times17+15=\frac{219}{17}$ *facit.*

2 Reduce $19\frac{12}{18}$ to an improper fraction. *facit* $\frac{354}{18}$
3 Reduce $16\frac{18}{100}$ to an improper fraction. $\frac{1618}{100}$
4 Reduce $100\frac{19}{59}$ to an improper fraction. $\frac{5919}{59}$
5 Reduce $514\frac{5}{16}$ to an improper fraction. $\frac{8229}{16}$
6 Reduce $47\frac{3141}{8400}$ to an improper fraction. $\frac{397941}{8400}$

CASE 4.

To reduce an improper fraction to a whole or mixt number;

RULE.

RULE.

Divide the upper term by the lower.

Note. This case, and case 3, prove each other.

EXAMPLES.

1 Reduce $\frac{219}{17}$ to its proper terms.

$$\begin{array}{r}17)219(12\tfrac{15}{17}\ \textit{facit.}\\ 17\phantom{(12\tfrac{15}{17}\ \textit{facit.}}\\ \hline 49\phantom{(12\tfrac{15}{17}\ \textit{facit.}}\\ 34\phantom{(12\tfrac{15}{17}\ \textit{facit.}}\\ \hline 15\phantom{(12\tfrac{15}{17}\ \textit{facit.}}\end{array}$$

2 Reduce $\frac{141}{17}$ to its proper terms. *facit* $8\frac{5}{17}$

3 Reduce $\frac{126}{48}$ to its proper terms. $2\frac{30}{48}$

4 Reduce $\frac{961}{17}$ to its proper terms. $56\frac{9}{17}$

5 Reduce $\frac{13}{7}$ to its proper terms. $1\frac{6}{7}$

6 Reduce $\frac{3848}{21}$ to its proper terms. $183\frac{5}{21}$

CASE 5.

To reduce a compound fraction to a single one ;

RULE.

Multiply all the numerators together for a new numerator, and all the denominators for a new denominator.

Note. Like figures in the numerators and denominators may be canceled, and frequently others contracted, by taking their aliquot parts.

EXAMPLES.

1 Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ to a single fraction.

$$\left.\begin{array}{l}2\times3\times4=\\3\times4\times5=\end{array}\frac{24}{60}=\frac{2}{5}\right\}\ \textit{facit.}\quad \text{Or, } \frac{2}{3}\text{ of }\frac{3}{4}\text{ of }\frac{4}{5}=\frac{24}{60}=\frac{2}{5}$$

Or, canceled $\frac{2}{\cancel{3}}$ of $\frac{\cancel{3}}{\cancel{4}}$ of $\frac{\cancel{4}}{5} = \frac{2}{5}$ of as before.

2 Reduce $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ to a single fraction. *facit* $\frac{1}{4}$

3 Reduce $\frac{7}{8}$ of $\frac{4}{6}$ of $\frac{9}{10}$ to a single fraction. $\frac{21}{40}$

4 Reduce $\frac{12}{13}$ of $\frac{5}{6}$ of $\frac{1}{2}$ to a single fraction. $\frac{5}{13}$

5 Reduce $\frac{5}{6}$ of $\frac{4}{8}$ of $\frac{3}{4}$ to a single fraction. $\frac{5}{24}$

6 Reduce $\frac{1}{2}$ of $\frac{8}{9}$ of $\frac{6}{7}$ to a single fraction. $\frac{8}{21}$

CASE 6.

To reduce the fraction of one denomination to the fraction of another, but greater, retaining the same value;

RULE.

Make it a compound fraction, by comparing it with all the denominations between it and that to which it is to be reduced; which fraction reduce to a single one.

EXAMPLES.

1 Reduce $\frac{5}{6}$ of a penny to the fraction of a pound.
$\frac{5}{6}$ of $\frac{1}{12}$ of $\frac{1}{20}=\frac{5}{1440}=\frac{1}{288}$£. *facit.*

2 Reduce $\frac{1}{2}$ of a farthing to the fraction of a shilling.
facit $\frac{1}{96}$*s.*

3 Reduce $\frac{8}{9}$ of an *oz.* troy to the fraction of a lb.
facit $\frac{2}{27}$ lb.

4 Reduce $\frac{6}{7}$ of a lb avoirdupois to the fraction of a *C.wt.*
facit $\frac{3}{392}$ *C.wt.*

5 Reduce $\frac{10}{13}$ of a pint of wine to the fraction of a *hhd.*
facit $\frac{1}{728}$*hhd.*

6 Reduce $\frac{10}{11}$ of a minute to the fraction of a day.
facit $\frac{1}{1584}$ *day.*

CASE 7.

To reduce the fraction of one denomination to the fraction of another, but less, retaining the same value;

RULE.

Multiply the given numerator by the parts of the denomination between it and that to which it is to be reduced, for a new numerator, and place it over the given denominator: which reduce to its lowest terms.

Note. This case, and case 6, prove each other.

EXAMPLES.

1 Reduce $\frac{5}{1440}$ of a lb. to the fraction of a penny.
$5\times20\times12=\frac{1200}{1440}=\frac{5}{6}$*d.* *facit.*

2 Reduce $\frac{1}{96}$ of a shilling to the fraction of a farthing.
facit $\frac{1}{2}$ *qr.*

3 Reduce $\frac{2}{27}$ of a lb. troy to the fraction of an *oz.*
facit $\frac{8}{9}$

4 Reduce $\frac{3}{392}$ of an *C.wt.* to the fraction of a lb.

facit $\frac{6}{7}$*lb.*

5 Reduce $\frac{1}{728}$ of a *hhd.* to the fraction of a pint.

facit $\frac{9}{13}$*pt.*

6 Reduce $\frac{1}{1584}$ of a day to the fraction of a minute.

facit $\frac{10}{11}$ *min.*

CASE 8.

To reduce the value or quantity of a fraction, to the known parts of an integer;

RULE.

Multiply the numerator by the common parts of the integer, and divide by the denominator.

EXAMPLES.

1 Reduce $\frac{2}{3}$ of a pound to its proper value.
$\frac{1}{3}$ of $\frac{20}{1}=\frac{40}{3}=$13*s* 4*d.* *facit.*
2 Reduce $\frac{14}{45}$ of a shilling to its value. *facit* 5*d.*$\frac{1}{33}$
3 Reduce $\frac{6}{7}$ of 5*l* 9*s*. to its value. 4*l* 13*s* 5*d.*$\frac{1}{7}$
4 Reduce $\frac{12}{16}$ of a pound troy to its value. 9*oz.*
5 Reduce $\frac{9}{11}$ of 10*C.* 1*qr.* 12*lb.* to its value.
facit 8*C* 1*qr* 25*lb* 1*oz* 7$\frac{3}{11}$*dr.*
6 Reduce $\frac{4}{7}$ of a mile to its value.
facit 4*fur.* 125*yds.* 2*ft.* 1*in.* 2$\frac{1}{7}$*b c.*
7 Reduce $\frac{4}{5}$ of an ell English to its value. *facit* 1*yd.*
8 What is the value of $\frac{6}{7}$ of a yard? *answer* 3*qr.* 1$\frac{5}{7}$*na.*
9 What is the value of $\frac{5}{19}$ of an acre? 1*R.* 2$\frac{2}{19}$*pls.*
10 What is the value of $\frac{3}{10}$ of a day? 7*hr.* 12*min.*
11 What is the value of $\frac{1}{8}$ of a dollar? 11$\frac{1}{4}$*d.*
12 What is the value of $\frac{1}{12}$ of a French crown?
answer 8$\frac{1}{3}$*d.*

13 What is the value sterling of $\frac{2}{9}$ths of an English guinea; and what in Pennsylvania currency?

answer 4*s* 8*d.* sterling, 7*s* 9*d.*$\frac{1}{3}$ Pennsylvania currency.

14 What is the value sterling of $\frac{4}{5}$ of a moidore; and what in Pennsylvania currency?

answer 1*l* 1*s* 7*d.*$\frac{1}{5}$ sterling, 1*l* 16*s.* currency.

CASE 9.

To reduce any given value, or quantity, to the fraction of any greater denomination of the same kind;

RULE.

Reduce the given quantity to its lowest term mentioned, for a numerator, and the integer into the same name for a denominator; which reduce to their lowest terms.

Note 1. If a fraction be given, multiply both parts by the denominator thereof, and to the numerator add the numerator of the given fraction.

2. Cases 8 and 9 prove each other.

EXAMPLES.

1 Reduce 13*s* 4*d.* to the fraction of a pound.

s. *d.*
13 4 = $\frac{160}{240}$ = $\frac{2}{3}$£. } *facit*
20

2 Reduce 5*d.*$\frac{1}{43}$ to the fraction of a shilling. *facit* $\frac{18}{43}$*s.*

3 Reduce 9*oz.* troy to the fraction of a *lb.* $\frac{3}{4}$*lb.*

4 What part of 5*l* 9*s.* is 4*l* 13*s* 5*d.*$\frac{1}{7}$? *answer* $\frac{6}{7}$

5 Reduce 3*C.* 8*lb.* 9*oz.* 13*dr.*$\frac{7}{13}$ to the fraction of a ton. *facit* $\frac{2}{13}$ *ton.*

6 Reduce 2*ft.* 8*in.* 1$\frac{1}{5}$*b.c.* to the fraction of a yard, *facit* $\frac{9}{10}$*yd.*

7 Reduce 1*yd.* to the fraction of an ell English. *facit* $\frac{4}{5}$ *ell.*

8 Reduce 3*qr.* 2*na.* to the fraction of a yard. *facit* $\frac{7}{8}$*yd.*

9 Reduce 1*R.* 30*P.* to the fraction of an acre. *facit* $\frac{7}{16}$ *acre.*

10 Reduce 13*hr.* 30*min.* to the fraction of a day. *facit* $\frac{9}{16}$ *day.*

CAES 10.*

To reduce fractions from one denomination to another of the same value, having the numerator of the required fraction given;

RULE.

As the numerator of the given fraction
Is to the denominator;
So is the numerator of the intended fraction
To its denominator.

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* Note. As the tenth, eleventh and twelfth cases are seldom useful, they may be taught or omitted, at the option of the teacher.

EXAMPLES.

1 Reduce $\frac{3}{4}$ to a fraction of the same value, whose numerator shall be 15.

As 3 .. 4 :: 15 .. 20 *facit* $\frac{15}{20}=\frac{3}{4}$.

2 Reduce $\frac{7}{8}$ to a fraction of the same value, the numerator of which shall be 42. *facit* $\frac{42}{48}$

3 Reduce $\frac{3}{4}$ to a fraction of the same value, the numerator of which shall be 34. *facit* $\frac{34}{45\frac{1}{3}}$

4 Reduce $\frac{5}{9}$ to a fraction of the same value, the numerator of which shall be 73. *facit* $\frac{73}{131\frac{2}{5}}$

CASE 11.

To reduce fractions from one denomination to another of the same value, having the denominator of the required fraction given;

RULE.

As the denominator of the given fraction
Is to its numerator;
So is the denominator of the intended fraction
To its numerator.

Note. Cases 10 and 11 prove each other.

EXAMPLES.

1 Reduce $\frac{3}{4}$ to a fraction of the same value, whose denominator shall be 20.

As 4 .. 3 :: 20 .. 15 *facit* $\frac{15}{20}=\frac{3}{4}$

2 Reduce $\frac{7}{8}$ to a fraction of the same value, the denominator of which shall be 49 *facit* $\frac{42\frac{7}{8}}{49}$

3 Reduce $\frac{3}{4}$ to a fraction of the same value, the denominator of which shall be 46. *facit* $\frac{34\frac{1}{2}}{46}$

4 Reduce $\frac{5}{9}$ to a fraction of the same value, the denominator of which shall be $131\frac{2}{5}$. *facit* $\frac{73}{131\frac{2}{5}}$

CASE 12.

To reduce a mixt fraction to a simple one;

RULE.

Multiply each term of the principal fraction by the denominator of that annexed, for the like term of the simple fraction, adding the annexed numerator to the product of the term to which it belongs.

EXAMPLES.

1 Reduce $\frac{42\frac{7}{8}}{49}$ to a simple fraction.

$$\left.\begin{array}{l} 42\times8+7=\underline{343} \\ 49\times8 \quad\;\, =392 \end{array}\right\}=\frac{7}{8}\ \textit{facit.}$$

2 Reduce $\frac{73}{131\frac{2}{5}}$ to a simple fraction.

$$\left.\begin{array}{l} 73\times5 \quad\;\, =\underline{365} \\ 131\times5+2=657 \end{array}\right\}=\frac{5}{9}\ \textit{facit.}$$

3 Reduce $\frac{34\frac{1}{2}}{46}$ to a simple fraction. *facit* $\frac{3}{4}$

4 Reduce $\frac{34}{45\frac{1}{3}}$ to a simple fraction. $\frac{3}{4}$

5 Reduce $\frac{17\frac{4}{9}}{43}$ to a simple fraction. $\frac{157}{387}$

6 Reduce $\frac{7}{19\frac{3}{5}}$ to a simple fraction. $\frac{5}{14}$

ADDITION OF VULGAR FRACTIONS.

RULE.

Reduce the given fractions (if necessary) to simple fractions, and to a common denominator (omitting integers:) Place the sum of the numerators over the common denominator; then to the value of said fractions, add the integers (if any.)

If fractions be of different integers, find their values separately, and add as in compound addition.

EXAMPLES.

1 Add $\frac{1}{2}$ and $\frac{7}{8}$ together.

$\frac{1}{2}+\frac{7}{8}=\frac{8}{16}+\frac{14}{16}=\frac{22}{16}=1\frac{3}{8}$ *facit.*

2 Add $\frac{7}{10}$, $\frac{11}{12}$ and $\frac{4}{9}$ together. *facit* $2\frac{11}{180}$

3 Add 19, 7 and $\frac{1}{2}$ of $\frac{2}{3}$ together. $26\frac{1}{3}$

4 Add $\frac{2}{4}$ of $\frac{7}{8}$ and $\frac{4}{6}$ of $\frac{19}{20}$ together. $1\frac{17}{240}$

5 Add $\frac{1}{3}$ of 95, and $\frac{7}{8}$ of 14 together. $43\frac{11}{12}$

6 Add $\frac{2}{3}$, and [illegible]7$\frac{1}{2}$ together. $18\frac{1}{6}$

7 Add 12$\frac{1}{2}$, 3$\frac{2}{3}$, and 4$\frac{3}{4}$ together. $20\frac{11}{12}$

8 Add 6, $\frac{7}{8}$ of $\frac{9}{10}$, $\frac{4}{7}$ of $\frac{1}{2}$, and 7$\frac{1}{4}$ together. $14\frac{327}{560}$

9 Add $\frac{3}{5}$, $\frac{4}{5}$, of $\frac{1}{3}$, and 9$\frac{3}{20}$ together. $10\frac{1}{60}$

10 Add $\frac{3}{4}$ of a penny to [illegible] of a pound. 2*s* 3*d* 1*qr.* $\frac{2}{3}$

11 Add $\frac{7}{8}$ of a pound to $\frac{3}{4}$ of a shilling. 18*s* 3*d.*

12 Add $\frac{1}{2}$ of a *lb.* troy to $\frac{7}{12}$ of an *oz.*

facit 6*oz.* 11*dwt.* 16*gr.*

13 Add $\frac{4}{7}$ of a ton to $\frac{9}{10}$ of an *Cwt.*

facit 12*C.* 1*qr.* 8*lb.* 12*oz.* 12$\frac{4}{5}$*dr.*

14 Add $\frac{3}{4}$ of a mile to $\frac{7}{10}$ of a furlong.

facit 6*fur.* 28*pls.*

15 Add $\frac{1}{2}$ of a yard to $\frac{2}{3}$ of a foot. *facit* 2*ft.* 2*in.*

16 Add $\frac{1}{3}$ of a day to $\frac{1}{2}$ of an hour. *facit* 8*hr.* 30*min.*

17 Add $\frac{1}{3}$ of a week, $\frac{1}{4}$ of a day, and $\frac{1}{2}$ of an hour together. *facit* 2*da.* 14$\frac{1}{2}$*hr.*

18 Add $\frac{2}{3}$ of a yard, $\frac{3}{4}$ of a foot, and $\frac{7}{8}$ of a mile together. *facit* 1540*yd.* 2*ft.* 9*in.*

19 What is the sum of $\frac{1}{7}$ of a £. $\frac{2}{9}$ of a shilling and $\frac{5}{11}$ of a penny? *answer* 3*s* 1*d* 1$\frac{10}{21}$*qr.*

20 What is the sum of $\frac{2}{7}$ of 15£. 3$\frac{3}{7}$£. $\frac{1}{3}$ of $\frac{5}{7}$ of $\frac{3}{5}$ of a £. and $\frac{2}{3}$ of $\frac{3}{7}$ of a shilling? *answer* 7*l* 17*s* 5*d.* 0$\frac{4}{7}$*qr.*

21 Add $\frac{2}{5}$ of 12£. + 4$\frac{3}{7}$ £. + $\frac{1}{5}$ of $\frac{9}{10}$ of a £. + $\frac{3}{5}$ of $\frac{5}{6}$ of a shilling into one sum. *facit* 9*l* 8*s* 8*d.* 0$\frac{8}{35}$*qr.*

22 If a merchant own $\frac{3}{8}$ of a ship, valued at 1500*l.* and buys another person's share of her, which is $\frac{5}{16}$; what part belongs to him, and what is it worth?

answer $\frac{11}{16}$, worth 1031*l* 5*s.*

SUBTRACTION OF VULGAR FRACTIONS.

RULE.

Prepare the fractions as in addition, and subtract the lower numerator from the upper, placing the difference over the common denominator.

If the lower numerator be the greater, subtract it from the common denominator, adding in the upper numerator and carry 1 to the units place of the integer.

If fractions be of different integers, find their values separately, and subtract as in compound subtraction.

EXAMPLES.

1 From $\frac{111}{112}$ take $\frac{3}{4}$.

$\frac{111}{112}-\frac{3}{4}=\frac{444}{448}-\frac{336}{448}=\frac{108}{448}=\frac{27}{112}$ *facit.*

2 From $\frac{97}{100}$ take $\frac{3}{7}$ *facit* $\frac{379}{700}$

3 From 96$\frac{1}{3}$ take 14$\frac{3}{7}$ 81$\frac{19}{21}$

4 From 96 take $\frac{3}{5}$ 95$\frac{2}{5}$

5 from $\frac{3}{9}$ of 76, take $\frac{9}{12}$ of 21 *facit* $9\frac{7}{12}$

6 From $\frac{100}{109}$, take $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{4}$ $\frac{1091}{1308}$

7 From $71\frac{1}{2}$, take $\frac{17}{19}$. $70\frac{23}{38}$

8 From $14\frac{1}{4}$ take $\frac{2}{3}$ of 19. $1\frac{7}{12}$

9 From $\frac{1}{2}$ of a £ take $\frac{3}{4}$ of a shilling. 9s 3*d.*

10 From $\frac{1}{2}$ of a shilling, take $\frac{1}{4}$ of a penny. 5*d.*$\frac{3}{4}$

11 From $\frac{3}{5}$ of an *oz.* troy, take $\frac{7}{8}$ of a *dwt.*

facit 11 *dwt.* 3*gr.*

12 From $\frac{1}{2}$ of a *C.wt.* take $\frac{7}{12}$ of a *lb.*

facit 1*qr.* 27*lb.* 6*oz.* $10\frac{2}{3}$*dr.*

13 From $\frac{2}{3}$ of a league, take $\frac{7}{10}$ of a mile.

facit 1*M.* 2*fur.* 16*pls.*

14 From 1 ell English, take $\frac{7}{10}$ of a quarter.

facit 1*yd.* $1\frac{1}{5}$*na.*

15 From 7 weeks, take $9\frac{7}{10}$ days.

facit 5*w.* 4*d.* 7*hr.* 12*min.*

16 From 4 days, $7\frac{1}{2}$ hours, take 1 day, $9\frac{3}{18}$ hours.

facit 2*da.* $22\frac{1}{3}$*hr.*

17 Borrowed $5\frac{3}{8}$£. paid $\frac{2}{7}$ of $4\frac{4}{6}$£. what remains?

answer 4*l* 3*s* 8*d.* $1\frac{1}{7}$*qr.*

18 What is the difference between $\frac{5}{9}$ of a £. and $\frac{2}{3}$ of $\frac{3}{4}$ of a shilling? *answer* 10*s* 7*d.* $1\frac{1}{3}$*qr.*

19 Take $\frac{2}{3}$ of a shilling from $\frac{2}{7}$ of $5\frac{1}{6}$£. and what is left? *answer* 1*l* 8*s* 11*d* $\frac{3}{7}$

20 If a merchant own $\frac{5}{8}$ of a ship, valued at 900*l.* and sells $\frac{2}{3}$ of his share; what part has he left, and what is it worth? *answer* $\frac{5}{24}$, worth 187*l* 10*s.*

MULTIPLICATION OF VULGAR FRACTIONS.

RULE.

If a compound fraction, or mixt number, be given, reduce them to single, or improper fractions; multiply the numerators together for a new numerator, and the denominators for a new denominator.

EXAMPLES.

1 Multiply $\frac{3}{7}$ by $\frac{3}{11}$

$\frac{3}{7}\times\frac{3}{11}=\frac{9}{77}$ *facit.*

2 Multiply $\frac{4}{8}$ by $\frac{7}{9}$. *facit* $\frac{7}{18}$

3 Multiply $\frac{5}{7}$ of $\frac{4}{5}$ by $\frac{7}{10}$ of $\frac{11}{12}$. *facit* $\frac{77}{250}$

4 Multiply $7\frac{1}{4}$ by $8\frac{1}{2}$. $61\frac{5}{8}$

5 Multiply $4\frac{1}{2}$ by $\frac{1}{5}$. $\frac{9}{10}$

6 Multiply $\frac{7}{8}$ by $13\frac{9}{10}$. $12\frac{13}{80}$

7 Multiply $\frac{1}{2}$ of 7 by $\frac{1}{2}$. $1\frac{3}{4}$

8 Multiply $\frac{3}{5}$ of 8 by $\frac{7}{8}$ of 5. 21

9 Multiply by $\frac{1}{2}$ by $\frac{4}{9}$ of 11. $2\frac{4}{9}$

10 Multiply $\frac{4}{5}$ of 91 by $71\frac{1}{2}$. $5205\frac{1}{5}$

11 Multiply $12\frac{3}{5}$ by $\frac{1}{3}$ of 7 $29\frac{2}{5}$

12 Multiply $7\frac{1}{2}$ by $9\frac{1}{4}$. $69\frac{3}{8}$

13 What is the product of $\frac{2}{9}$ of $\frac{3}{5}$, and $\frac{5}{8}$ of $3\frac{2}{7}$
answer $\frac{23}{84}$

14 What is the product of $5\times\frac{2}{3},\times\frac{2}{7}$, of $\frac{3}{5},\times 4\frac{1}{6}$.
answer $2\frac{8}{21}$

15 What is the continued product of $\frac{2}{3}$, $3\frac{1}{4}$, 5, and $\frac{3}{4}$ of $\frac{3}{5}$
answer $4\frac{7}{8}$

16 If $3\frac{2}{3}$ be multiplied by $\frac{1}{7}$, and this product again by $\frac{3}{5}$ of $\frac{3}{4}$, what is the last product? *answer* $\frac{33}{140}$

DIVISION OF VULGAR FRACTIONS.

RULE.

Prepare the fractions, if necessary, as in multiplication: multiply the denominator of the divisor into the numerator of the dividend for a numerator; and the numerator of the divisor into the denominator of the dividend for a denominator.

EXAMPLES.

1 Divide $\frac{17}{21}$ by $\frac{3}{5}$.
$\frac{3}{5})\frac{17}{21}(\frac{85}{63}=1\frac{22}{63}$ *facit.* Or thus, $\frac{17}{21}\div\frac{3}{5}=\frac{85}{63}=1\frac{22}{63}$

2 Divide $\frac{13}{19}$ by $\frac{7}{9}$. *facit* $\frac{117}{133}$

3 Divide $\frac{14}{15}$ by $\frac{7}{10}$. $1\frac{1}{3}$

4 Divide $1\frac{1}{2}$ by $4\frac{8}{10}$. $\frac{5}{16}$

5 Divide $\frac{7}{8}$ by 4. $\frac{7}{32}$

6 Divide 4 by $\frac{7}{8}$. $4\frac{4}{7}$

7 Divide $\frac{1}{5}$ of 19 by $\frac{2}{3}$ of $\frac{3}{4}$. $7\frac{3}{5}$

8 Divide $\frac{1}{2}$ of $\frac{2}{3}$ by $\frac{2}{3}$ of $\frac{3}{4}$. $\frac{2}{3}$

9 Divide $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{1}{2}$ of $\frac{2}{3}$. $1\frac{1}{2}$

10 Divide $4\frac{5}{9}$ by $\frac{5}{9}$ of 4. $2\frac{1}{20}$

11 Divide $\frac{5}{9}$ of 4 by 4 $\frac{5}{9}$. *facit* $\frac{20}{41}$

12 Divide $\frac{7}{8}$ of 6 by $\frac{3}{4}$ of $\frac{6}{7}$ of $\frac{11}{12}$. $8\frac{10}{11}$

13 What is the quotient of $7\frac{1}{3}$ divided by $9\frac{5}{9}$?

answer $\frac{33}{43}$

14 What is the quotient of $\frac{2}{3}$ of $\frac{1}{2}$ divided by $\frac{5}{7}$ of $7\frac{2}{5}$?

answer $7\frac{1}{171}$

15 What is the quotient of $5205\frac{1}{4}$ divided by $\frac{4}{5}$ of 91?

answer $71\frac{1}{2}$

THE SINGLE RULE OF THREE IN VULGAR FRACTIONS.

DIRECT PROPORTION.

RULE.

Prepare the given terms, if necessary, by reduction, and state them as in whole numbers; multiply the second and third terms together, and divide that product by the first; Or,

Invert the dividing term, and multiply the three together for the fractional answer.

Note. When the dividing term is inverted, the note to case 5 in reduction is applicable here.

EXAMPLES.

1 If $\frac{3}{5}$ of a yard cost $\frac{7}{15}$ of a £. what cost $\frac{3}{14}$ yards?
As $\frac{3}{5} .. \frac{7}{15} :: \frac{3}{14} .. \frac{105}{630} = \frac{1}{6} =$ 3*s* 4*d.* *answer.*

Or, Cancelled; $\dfrac{\cancel{5}\ \ \cancel{7}\ \ \cancel{3}}{\cancel{3}\ \ \cancel{15}\ \ \cancel{14}} = \dfrac{1}{6}£. = 3s\ 4d.$

3×2

2 If $\frac{11}{13}$*lb.* of sugar cost $\frac{7}{13}$*s.* what cost $\frac{33}{43}$*lb.*?

answer 4*d.* 3*qr.* $\frac{1657}{1385}$

3 If $\frac{4}{7}$ of an ell English cost $\frac{7}{13}$£. what is that per ell?

answer 18*s* 10*d.* $\frac{2}{13}$

4 When 2*oz.* of silver cost $16\frac{5}{12}$*s.* what is the value of $\frac{3}{4}$ *oz.*?

answer 6*s* 1*d* 3*qr.* $\frac{1}{2}$

5 If $6\frac{1}{2}$ yards cost 18*s.* what buys $9\frac{1}{4}$ yards?

answer 1*l* 5*s* 7*d.* 1*qr.* $\frac{7}{13}$

6 Sold 500 bushels of wheat, at $56\frac{3}{5}$*d.* per *bu.* what sum passes to the credit of that article?

answer 117*l* 18*s* 4*d.*

7 If $1\frac{1}{4}$ yard cost 9*s.* what is the value of $16\frac{1}{4}$ yards?
answer 5*l* 17*s.*

8 What sum pays for 100*yds.* of cloth, at $17\frac{1}{5}$*s.* per *yd.*?
answer 86*l*

9 At $5\frac{1}{2}$*s.* per *oz.* what are $16\frac{1}{13}$*oz.* of silver worth?
answer 4*l* 12*s* $1\frac{3}{5}$*qr.*

10 If $\frac{9}{10}$ *C.wt.* cost $14\frac{4}{20}$£. what will $7\frac{1}{2}$ *C.wt.* amount to?
answer 118*l.* 6*s* 8*d.*

11 If $\frac{3}{5}$ of an ell English be worth $\frac{2}{3}$ of 19*s.* what is the value of 7 ells?
answer 7*l* 7*s* 9*d.* $1\frac{1}{3}$*qr.*

12 If 8*lb.* of tobacco cost 4*s* 9*d.*$\frac{3}{5}$, what is that per *lb.*
answer 7*d.*$\frac{1}{5}$

13 How much cash will purchase 4 pieces of cloth, each $27\frac{3}{8}$ yards, at $15\frac{5}{8}$*s.* per yard?
answer 85*l* 10*s* 11*d.*$\frac{1}{4}$

14 Please to tell the quantity and value of $3\frac{1}{2}$ pieces of silk, each $24\frac{1}{3}$ yards, at 6*s* 0*d.* per yard?
answer quantity $85\frac{1}{6}$*yds.* value 25*l* 14*s* 6*d.* $2\frac{1}{3}$*qr.*

15 If $\frac{1}{3}$*lb.* less by $\frac{1}{6}$, cost 13 $\frac{1}{5}$*d.* what cost 14*lb.* less by $\frac{1}{5}$ of 2*lb.*?
ancwer 4*l* 9*s* $9\frac{3}{25}$*d.*

16 Bought 120*lb.* of tea, at $8\frac{5}{8}$*s.* per *lb.* which being sold for 70*l.* required the gain per cent?
answer 35*l* 5*s* 3*d.* 3*qr.*$\frac{5}{69}$

17 What will $13\frac{2}{3}$*lb.* cost at the rate of $17\frac{5}{8}$£. per *C.wt.*
answer 2*l* 3*s* $\frac{3}{224}$

18 If $\frac{1}{8}$ of a ship be worth 73*l* 1*s* 3*d.* what part of her may be purchased for 250*l* 10*s.*?
answer $\frac{3}{7}$

19 If $3\frac{1}{2}$ times $3\frac{1}{2}$*lb.* cost $1\frac{1}{2}$ time $1\frac{1}{2}$*l.* what is the value of $\frac{1}{2}$ of $\frac{1}{3}$ of $12\frac{1}{4}$*lb.*?
answer 7*s* 6*d.*

20 A mercer sold $4\frac{3}{4}$ pieces of silk, each containing $22\frac{3}{8}$ *yds.* at $8\frac{3}{4}$*s.* per *yd.* what is the amount of his bill?
answer 46*l* 9*s* 11*d.* $2\frac{1}{8}$*qr.*

21 A person having $\frac{4}{5}$ of a ship, sells $\frac{2}{3}$ of his share for 321*l.* what is the proportional worth of the whole vessel?
answer 598*l* 2*s* 6*d.*

INVERSE PROPORTION.

RULE.

After the necessary preparations, multiply the first and second terms together, and divide that product by the third term; or,

Invert the dividing term, and multiply them together for a fractional answer. See the last note.

EXAMPLES.

1 What quantity of shalloon that is $\frac{3}{4}$ *yd.* wide, will line $7\frac{1}{2}$ *yds.* cloth, $1\frac{1}{2}$ *yd.* wide?

$$\left.\begin{array}{ll}\textit{First,} & 7\frac{1}{2}=\frac{15}{1}\,yd.\\ \textit{Second,} & 1\frac{1}{2}=\frac{3}{2}\,yd.\end{array}\right\}\ \text{As}\ \overset{yd.}{\frac{3}{2}}\ ..\ \overset{yd.}{\frac{15}{2}}\ ::\ \overset{yd.}{\frac{3}{4}}\ ..\ \overset{yd.}{15}\ \textit{answer.}$$

$$\text{Or, cancelled;}\ \frac{\cancel{3}\ \ 15\ \ \cancel{4}}{\cancel{2}\ \ \cancel{2}\ \ \cancel{3}}=15\ yds.$$

2 If $3\frac{1}{4}$ yards of cloth, that is $1\frac{1}{5}$ yard wide, be sufficient to make a cloak; how much Persian which is but $\frac{4}{5}$ yard wide will be required to line it? *answer* 4*yds.* 3*qrs.* 2*na.*

3 16 men finishing a piece of work in $28\frac{1}{3}$ days: the time is required in which 12 men should do it?

answer $37\frac{7}{9}$ *days.*

4 In exchanging $20\frac{1}{2}$ yards of cloth of $1\frac{1}{4}$ yard wide, for some of the same quality of $3\frac{1}{4}$ yards wide; what quantity of the latter makes an equal barter? *answer* $34\frac{1}{6}$ *yds.*

5 If 3 men can perform a service in $4\frac{1}{2}$ hours; in what time may ten men effect it? *answer* 1*hr.* 21*min.*

6 When wheat is at $5\frac{1}{2}$ shillings per bushel, if the penny loaf weigh 7*oz.* what is it per bushel, when the penny loaf weighs $2\frac{1}{2}$*oz.* 15*s* 4*d* 3*qr.*$\frac{1}{5}$

7 If when the price of wheat is $6\frac{1}{4}$*s.* per bushel, the penny loaf weighs 9*oz.* what must it weigh, when that grain sells at $4\frac{1}{2}$*s.* per bushel? *answer* 12*oz* 8*dr.*

8 A piece of tapestry 3 ells Flemish wide, and four long, is to be lined with stuff which is but $\frac{3}{4}$ *yd.* wide; how many yards are sufficient? *answer* 9*yds.*

9 Suppose 275 yards of cloth, that is $1\frac{1}{4}$ yard wide, make coats for 130 men; what number of yards of shalloon of $\frac{3}{4}$ yards wide will be requisite to line them?

answer $458\frac{1}{3}$ *yds.*

10 How many yards of baize ell English wide, will be sufficient to line 20 yards of camlbct, that is $\frac{3}{4}$ yard wide?

answer 12 *yds.*

11 A merchant bartering $5\frac{8}{9}$*C.* of sugar at $6\frac{3}{4}$*d.* per *lb.* for tea, at $8\frac{5}{6}$*s.* per *lb.* would know what quantity of the latter article he is to receive? *answer* $43\frac{1}{19}$*lb.*

12 What number of pieces of merchaudize, at $20\frac{1}{8}s.$ per piece, are equivalent to $240\frac{1}{7}$ pieces, at $12\frac{1}{2}s.$ per piece?

answer $149\frac{177}{1127}$ pieces.

13 A lends to B $100\frac{2}{3}l.$ for $6\frac{2}{3}$ months; what sum should B lend A for $3\frac{5}{6}$ years to requite his kindness?

answer 14*l* 11*s* 9*d*. $1\frac{55}{69}qr.$

14 How many yards of cloth, at $8\frac{1}{2}s.$ per yard, must be given for $26\frac{5}{8}$ yards, at $5\frac{7}{12}s.$ a yard?

answer 17*yds.* 1*qr.* 3*na.*$\frac{4}{17}$

THE DOUBLE RULE OF THREE IN VULGAR FRACTIONS.

RULE.

Prepare the terms, if necessary; then state, and work them agreeably to the directions given in whole numbers. Or,

Invert the dividing terms, and multiply the upper figures continually for the numerator, and those below for the denominator of the fractional answer.

Note. The note to case 5, in reduction, may be applied here.

EXAMPLES.

1 If $\frac{3}{4}$ of a yard of cloth that is $\frac{7}{8}yd.$ wide cost $\frac{2}{5}l.$ what is the value of $\frac{5}{8}$ yard that is $1\frac{3}{4}$ yard wide, being of the same quality?

$$\text{If }\left.\begin{array}{l}\frac{3}{4}yd.\\ \frac{7}{8}yd.\end{array}\right\}\frac{2}{5}l.\left\{\begin{array}{l}\frac{5}{8}yd.\\ \frac{7}{4}yd.\end{array}\right\}$$

$$\left.\begin{array}{l}\frac{3}{4}\times\frac{7}{8}=\frac{21}{32}\\ \frac{5}{8}\times\frac{7}{4}\qquad\frac{2}{5}=\frac{70}{160}\end{array}\right\}\frac{7|0}{16|0}\div\frac{21}{32}=\frac{224}{336}=\frac{2}{3}l.=13s\ 4d.\ \textit{answer}.$$

Or,

$$\text{Cancelled. }\frac{\cancel{4}\times\cancel{8}\times2\times\cancel{5}\times\cancel{7}}{3\times\cancel{7}\times\cancel{5}\times8\times\cancel{4}}=\frac{2}{3}l.=13s\ 4d.$$

2 If 9 students spend $10\frac{7}{9}l.$ in 18 days; what sum will 20 students spend in 30 days? *answer* 39*l* 18*s* 4*d*.$\frac{20}{81}$

3 The labour of 3 men for $19\frac{1}{2}$ days, comes to $8\frac{9}{10}l.$ at the same rate, what must 20 men have for working $100\frac{1}{4}$ days? *answer* 305*l* 0*s* 8*d* $\frac{8}{39}$

4 If 5 persons drink $7\frac{4}{5}$ gallons of beer in a week, what quantity will serve 8 persons $22\frac{1}{2}$ weeks? *ans.* $280\frac{4}{5}$ gallons.

5 Fourteen persons upon examining into their expences, for 20 weeks past, found they had laid out $40\frac{1}{5}l.$ in what time, at the same rate, may $20l.\frac{3}{7}$ be expended by 46 persons?

answer $3\frac{56}{115}$ weeks.

6 If $13\frac{1}{3}l.$ in $\frac{3}{4}$ of a year, gain $1\frac{1}{12}l.$ interest, what interest will $50l.$ gain in $\frac{5}{12}$ of a year; and at what rate per cent. per annum? *ans.* $2l$ $5s$ $1d.$ $2\frac{2}{3}qr.$ at $10\frac{5}{6}$ per cent.

7 If $50l.$ in $\frac{5}{12}$ of a year gain $2l$ $5s$ $1d.$ $2\frac{2}{3}qr.$ in what time will $13\frac{1}{3}l.$ gain $1\frac{1}{12}l.$ and at what rate per cent. per annum? *answer* $\frac{3}{4}$ year, at $10\frac{5}{6}$ per cent.

8 When 12 persons use $1\frac{1}{8}$ pound of tea per month; how much should a family of 8 persons provide for $\frac{1}{2}$ year?

answer $4\frac{1}{2}lb.$

9 Two brothers at school compute the expence of their b[illegible]ding, tuition, &c. for $\frac{3}{4}$ of a year to be $56\frac{1}{4}£$. how [illegible] will the education of 3 sons for $5\frac{1}{3}$ years cost their [illegible] at that rate? *answer* $600l.$

DECIMAL FRACTIONS.

A DECIMAL Fraction is a part, or parts, of a unit, denoted by a point prefixed to a figure, or figures, thus, ,4 ,45, ,456; the first figure after the point, denotes so many tenths of a unit; the second so many hundredths of a unit, or tenths of one tenth; which are equal to, and read as, $\frac{4}{10}$, $\frac{45}{100}$, $\frac{456}{1000}$.

A mixt number consists of a whole number and a decimal; thus, 245, 789; which is, $245\frac{789}{1000}$.

As whole numbers, counting from the right to the left, increase in a ten fold proportion; so decimals, counting towards the right, decrease in the same proportion; which is exemplified in the following.

TABLE.

C. of Millions	*X. of Millions*	*Millions*	*C. of Thousands*	*X. of Thousands*	*Thousands*	*Hundreds*	*Tens Units*	*Units*	*Tenth Part*	*Hundredth Parts*	*Thousandth Parts*	*X. Thousandth Parts*	*C. Thousandth Parts*	*Millionth Parts*	*X. Millionth Parts*	*C. Millionth Parts*	*M. Millionth Parts*
9	8	7	6	5	4	3	2	1.	1	2	3	4	5	6	7	8	9

Note. Ciphers annexed to decimals neither increase nor decrease their value; thus, .25000, and .25 are equal; but prefixed, decrease them in a tenfold proportion; thus, .5, .05, .005, all express different decimals, and $=\frac{5}{10}, \frac{5}{100}, \frac{5}{1000}$.

ADDITION OF DECIMALS.

RULE.

Place the numbers according to their value; viz units under units, tenths under tenths, &c. and add as in addition of integers; putting the point in the sum total exactly under those in the example.

EXAMPLES.

Yards.	*Pounds.*
947,621	763,6821
576,71	38,781
2718,94	6,64
619,473	37,86
21,66	3,4782
7,8	7,36
4892,204	

What is the sum of 450+31,47+376,004+1,08+456+,76+,05? *answer* 1315,364

If 2476,8471 + 94,9 + 9,8941 + 867,05 + 84,9 + 271,007+5,1008+1,6789 be added together, what is the sum? *answer* 3811,3779

SUBTRACTION.

SUBTRACTION OF DECIMALS.

RULE.

Place the number, as in addition, with the least under the greatest; and in the difference, set the point directly under those in the example.

EXAMPLES.

Yards.	*Gallons.*	*Miles.*	*Acres.*
576.271	3618.218	24611.1	6827.4681
89.7167	1981.85	9716.701	6018.91
486.5543			

1 From 100.17, take 84.476, what is left?

answer 15.694

2 What is the difference between the sum of 841.46 + 109.62 + 34.691, and of 478.462 + 37.66 + 378.8?

answer 90,849

MULTIPLICATION OF DECIMALS.

RULE.

Multiply as in integers, and point off as many decimal places in the product, as are in both the factors.

Note 1. If the decimal places be wanting in the product, ſupply them with ciphers to the decimal point.

2. Multiplication in decimals may be contracted thus; Set the units figure of the multiplier under ſuch place of the multiplicand, as is to be the loweſt retained in the product; and place all the remaining figures of the multiplier in an inverted order: in multiplying, begin with the figure in the multiplicand which ſtands over the multiplying figure, adding the increaſe which may ariſe by carrying one for the firſt five, and one more for every ten after and place the products ſo, that the right hand figures ſtand under each other.

EXAMPLES.

EXAMPLES.

1 Multiply 743,56815 by 52,647

	Contracted and to retain Three decimals places.
743,56815	743,56815
52,647	746,25
520497705	37178408
2974272 60	14871 36
446140890	446141
148713630	29742
371784075	5205
facit 39146,63239305	39146,632

2 Multiply 79,347 by 23,15 *facit* 1836,88305
3 Multiply ,63478 by ,8264 ,524582192
4 Multiply 3,141592 by 52,7438 165,6995001296
5 Multiply ,385746 by ,00463 ,00178600398
6 Multiply ,002534 by ,03256 ,00008250704
7 Multiply 245,378263 by 72,4385, reserving 4 places of decimals in the product *facit* 17774,8333
8 Multiply 674,4375 by 27.368, reserving only the integers in the product. *facit* 18458
9 Multiply 27,14986 by 92.41035, and retain 6 places of decimals in the product. *facit* 2508,928065
10 Multiply 184,8207 by 13,57493, and retain 3 places of decimals in the product. *facit* 2508,928

DIVISION OF DECIMALS.

RULE.

When the dividend has not as many decimal places as the divisor, or will not contain it, annex ciphers to supply the defect; then divide as in integers; and point off in the quotient, as many decimal places as the decimal places of the dividend exceed those in the divisor, Or, Let the divisor be conceived to stand under the containing left hand figures of the dividend, and the first figure of the quotient will possess the same place of integers or decimals, as that in the dividend which corresponds to the units place of the divisor.

When there are many figures in the divisor, the operation may be contracted, thus;

Find what place of integers, or decimals, the first figure of the quotient will possess; and consider how many quotient figures will serve the present purpose; then take the same number of the left hand of the divisor, and as many of the dividend as will contain them (less than ten times) rejecting the rest; then, instead of bringing figures down from the dividend, separate one from the right of the divisor, as often as necessary, till the whole be exhausted; remembering to carry from the right hand figures of the divisor, as in contracted multiplication.

When there are not so many figures in the divisor, divide as usual, till there be as many of the quotient figures found as the divisor is short of the intended quotient; then use the contraction.

EXAMPLES.

1. Divide 2508,92806 by 92,41035

92,41035)2508,92806(27,1498+*facit.*
18482070

66072106
64687245

13848610
9241035

46075750
36964140

91116100
83169315

79467850
73928280

5539570

tracted, so as to have three decimal places in the quotient.

```
92,41035)2508,92806(27,149+facit.
         1848207
         -------
          660721
          646872
          ------
           13849
            9241
            ----
            4608
            3696
            ----
             912
             832
             ---
              80
```

Divide 1836,88305 by 23,15 *facit* 79,347

Divide 3673,7661 by 158,694 23,15

Divide 234,70525 by 64,25 3,653

Divide 9, by ,9 10,

Divide ,9 by 9, ,1

Divide ,3 by 3, ,1

Divide ,00178600398 by ,00463 ,385746

Divide 2508,92806505 by 92,41035, so as to have 4 es of decimals in the quotient. *facit* 27,1498

0 Divide ,00357200796 by ,771492 *facit* ,00463

1 Divide 87,076326 by 9,365407, and let there be 7 es of decimals in the quotient. *facit* 9,2976352

2 Divide 174,152652 by 18,730814, and let there be 3 es of decimals in the quotient. *facit* 9,297

REDUCTION OF DECIMALS.

CASE 1.

To reduce a vulgar fraction to a decimal;

RULE.

Annex as many ciphers to the numerator as may be neces- r, which divide by the denominator.

Note. The quotient muſt conſiſt of as many decimal places, as there are ciphers annexed.

If a compound fraction be given, reduce it firſt to a single one.

EXAMPLES.

1 Reduce $\frac{1}{4}$ to a decimal.

$$4)1,00$$

facit .25

2 Reduce $\frac{1}{2}$ to a decimal. *facit* ,5
3 Reduce $\frac{3}{4}$ to a decimal. ,75
4 Reduce $\frac{5}{26}$ to a decimal. ,1923+
5 Reduce $\frac{26}{57}$ to a decimal. ,45614+
6 Reduce $\frac{11}{13}$ of $\frac{10}{14}$ to a decimal. ,6043956+
7 Reduce $\frac{12}{16}$ of $\frac{5}{13}$ of $\frac{7}{26}$ to a decimal, ,07766+
8 What is the equivalent decimal for $\frac{3}{8}$ *answer* ,375
9 What is the decimal of $\frac{1}{25}$? ,04
10 What are the equivalent decimals for $\frac{11}{20}$, $\frac{57}{60}$, $\frac{36}{96}$, $\frac{7}{8}$ and $\frac{14}{256}$? *answer* ,55, ,95, ,375, ,875, ,0546875

CASE 2.

To reduce any sum, or quantity, to the decimal of a given denomination;

RULE.

First, Divide the given sum, &c. in its lowest mentioned denomination, by the number of like parts in the propoſed integer; the quotient will be the decimal required. Or,

Secondly, Write the given numbers orderly from the least to the greatest in a perpendicular column, and divide each of them by such a number as will reduce it to the next name, annexing the quotient to the succeeding number; the last quotient will be the required decimal.

EXAMPLES.

1 Reduce 15*s* 8*d*.½ to the decimal of a pound; also, 3*qrs*. 12*lb*. 6*oz*. 14,592*dr*. to that of an *C.wt.*

s. *d*. *qrs*.
1[illegible] 8½=754 }
20 0 =960 } 960)754,00(,7854166£.+*facit.*
6720
8200, &c.

Or;

4 | 2. *qr*.
12 | 8. 5*d*.
2,0 | 15. 708333*s*.
| ,7854166+

16 { 4 | 14,592 *dr*.
{ 4 | (3,648
16 { 4 | 6,912 *oz*.
{ 4 | (1,728
28 { 4 | 12,432 *lb*.
{ 7 | (3,108
4 | 3,444 *gr*.

facit ,861 *C.wt.*

2 Reduce 7*s* 6*d*. to the decimal of a pound. *facit* ,375

3 Reduce 9*d*. to the decimal of a pound. ,0375

4 Reduce 10*s* 9*d*.¼ to the decimal of a pound. *facit* .5385416+

5 Reduce 24 grains to the decimal of a *lb*. *facit* ,0041666+

6 Reduce 14 *drams* to the decimal of a *lb*. avoirdupois. *facit* ,0546875

7 Reduce 4*C*. 2*qr*. to the decimal of a ton. *facit* ,225

8 Reduce 76 yards to the decimal of a mile. *facit* ,04318+

9 Reduce 3*qr*. 2*na*. to the decimal of a yard. *facit* ,875

10 Reduce 4 perches to the decimal of an acre. *facit* ,025

11 Reduce 1 pint to the decimal of a gallon. ,125

12 Reduce 7 minutes to the decimal of a day. *facit* ,00486+

13 Reduce 3*C.wt*. 2*qr*. 14*lb*. to *C.wt.* 3,625*C.wt.*

14 Reduce 7*yds*. 2*qr*. 3*na*. to yards. 7,6875*yds*.

15 Reduce 13*A*. 1*R*. 14*P*. to acres. 13,3375*A*.

16 Reduce 3*mo*. 1*w*. 5*da*. to months. 3,42857+*mo*.

CASE

CASE 3.

To reduce a decimal fraction to its value;

RULE.

Multiply it by the known parts of the integer.

Note. To find the value of any decimal of a £. by inſpection; double the firſt figure after the point for ſhillings, adding one, if the ſecond be 5 or upwards; the ſecond, if leſs than 5, or its exceſs above 5, call tens, and the third units of farthings, abating one when above 12, and two if above 36.

EXAMPLES.

1 What is the value of ,7854166 of a pound?

,7854166 — By inspection.
20 — ,7854166

s. 15,7083320 — *s.* 15 8 2
12

That is 7+7+1=15*s.*
and 35−1=34*qrs.*=8*d.*½ } = 15*s.* 8*d.*½

d. 8,4999840
4

gr. 1,999936 *answer* 15*s.* I*d.* 1,9999*qr.*

2 What is the value of ,76 of a pound?
answer 15*s.* 2*d.* 1,6*qr.*

3 What is the value of ,625 of a shilling? *answer* 7*d.*½

4 What is the value of ,8322916 of a £.
answer 16*s* 7*d.*¾

5 What is the value of ,861 of an *C. wt.*?
answer 3*qr.* 12*lb.* 6*oz.* 14,592*dr.*

6 What is the value of ,7 of a *lb.* troy?
answer 8*oz.* 8*dwt.*

7 What is the value of ,671 of a day?
answer 18*hr.* 15*min.* 50,4 *sec.*

8 What is the value of ,71 of 4 *oz.* troy?
answer 2*oz.* 16*dwt.* 19,2*gr.*

9 What is the value of ,76 of a league?
answer 2*M.* 3*pls.* 1*yd.* 3*in.* 1,8*b.c.*

10 What is the value of ,4712 of an ell English?
answer 2*qr.* 1,424*na.*

11 What is the value of ,092 of 3*A.* 2*R* ?
answer 1*R.* 11,52*per.*

12 What is the value of ,3 of a year?
answer 109*da.* 13*hr.* 48*min.*

13 What is the value of ,6875 of a yard?
answer 2*qr.* 3*na.*

14 What is the value of ,3375 of an acre?
answer 1*R.* 14*per.*

15 Find the value of ,785 of a £. by inspection.
answer 15*s* 8*d.* $\frac{2}{5}$

16 Find the value of ,875 of a £. by inspection.
answer 17*s* 6*d.*

17 What is the value of a tenement for nine years, at 12,4*l.* per annum? *answer* 111*l* 12*s.*

18 Sold 25 yards of superfine scarlet cloth, at 2,75*l* per yard; what was its value? *answer* 68*l* 15*s.*

19 What is the sum of ,48 of a £. and ,16 of a shilling?
answer 9*s.* 9,12*d.*

20 What is the sum of ,17 of a *lb.* troy, and ,84 of an *oz.*? *answer* 2*oz.* 17*dwt.* 14,4*gr.*

21 What is the sum of ,17*T.* ,19*C.wt.* ,17*qrs* ,7*lb.*
answer 3*C.wt.* 2*qr.* 15,54*lb.*

22 What is the sum of ,78 acres, and ,67 rood?
answer 3*R.* 31,6 *per.*

23 What is the difference between ,17*l.* and 7*s.*?
answer 2*s* 8*d.* 1,6*qr.*

24 What is the difference between ,41 days, and ,16 of an hour? *answer* 9*hr.* 40*min.* 48*sec.*

THE SINGLE RULE OF THREE IN DECIMALS.

The operation both in direct and inverse proportions are agreeably to those rules in page 59, and 63, having regard to placing the points.

DIRECT PROPORTION.

EXAMPLES.

If 1,4*lb.* of mace cost 14,5*s.* what cost 75,31*lb*?

lb. *s.* *lb.* £. *s.* *d.* *qr.*
As 1,4 .. 14,5 : : 75,31 .. 38 19 11 3,52 *answer.*

2 If 1,6*C.* of sugar sell for 3*l* 12,76*s.* what is the proportional cost of 3*hhds.* each 11*C.* 3*qr.* 10,12*lb.*

answer 80*l* 15*s* 3*d.* 3,36*qr.*

3 If 1,5*oz.* of silver be worth 7,8*s.* what is the value of 9,7*lb.*? *answer* 30*l* 5*s* 3*d.* 1,44*qr.*

4 If 1,47*C.* of sugar be worth 4,5*l.* what is that for 1,7*lb*? *answer* 11,1*d.*

5 Sold 12,5*hhds.* of wine, at 1,2*s.* per pint; query the amount? *answer* 378*l.*

6 Bought 3 pieces of cloth, each 21,5 yards, at 12,3*s.* per yard; please to cast up the cost. *facit* 39*l* 13*s* 4,2*d.*

7 If 8,4*lb.* of tobacco cost 16*s* 4,6*d.* what is the value of 3*hhds.* each 4*C.* 2*qr.* 7,4*lb.* *answer* 149*l* 12*s* 3*d.*½

8 How many yards are in a piece of cloth which brings 6*l* 13,12*s.* at 4*s* 2,6*d.* per yard? *answer* 31,569*yds.*

9 Bought 5,8 tons of oil for 60,4*l.* whereof 50,9 gallons leaked out; what must the rest be sold for per gallon, that the purchaser may be no loser? *answer* 10,27*d.*

10 A grocer bought 7,6*C.wt.* of sugar, at 40,1*s.* per *C.wt.* which he sold at 4,5*d* per *lb.* whether did he gain or lose, and how much? *answer* gained 14*s* 5*d.* 1,12*qr.*

11 Bought 3*C.* 1,5*qr.* of cloves, at 2,75*s.* per *lb.* which was sold for 60*l* 11*s* 6*d.* query the gain? *answer* 8*l* 12*s.*

12 When a merchant buys 436 yards of cloth at 8,5*s.* per yard what will he gain by disposing of it at 10,75*s.* per yard?

answer 49*l* 1*s.*

13 A owes B 296,85*l.* but compounds for 7,5*s* in the £. what sum must B receive? *answer* 111*l* 6*s* 4*d* 2*qr.*

14 How many English ells of linen may be bought for 25*l* 18*s* 1*d.*¾ at 7*s* 9*d.*½ per yard? *answer* 53*E.* 1*qr.*

15 If a yard of ribband sell for 4,5 cents, how many dollars will buy 345 yards? *ans.* 15,525, *i.e.* 15*D.* 52½*c.*

D.d. c.m

16 When 675 yards cost 12,8 2 5, how many yards may be had for 38 mills? *answer* 2 yards.

D.d. c.

17 If 19 yards of calico bring 25,7 5; what will 435,5 yards to come?

D. d. c. m.

answer 590,2 1 7$\frac{2}{19}$.

18 What

8 What must be paid for 7⅜ *yds.* of broad cloth, at 5½ ars per yard? *answer* 40,5625*D.* or 40*D.* 56¼*cts.*

9 How does broad cloth sell per yard, when 7⅜ yards cost). 56¼*cents*? *answer* 5,5*D.*

o The French foot is just 1,068*ft.* English; how tall a would a 6*ft.* Philadelphian be at Paris!

answer but 5,618*ft.*

INVERSE PROPORTION.

EXAMPLES.

How many men can do as much work in ,4 of a ith, as 16 could in a month and a half?

mo. men. mo. men.

As 1,5 : 16 :: ,4 : 60 *answer.*

If, when wheat-flour is as high as 6*l.* per *C.wt.* the penny cake weighs 1,1333*oz.* what should be the weight t, when flour is only 1,8125*l.* per *C.wt.*?

answer 3,75*oz.*=3*oz*, 12*dr.*

If a board be ,75 foot broad, what length will it require neasure 12 square feet? *answer* 16*ft.*

How much Persian ,75*yd.* wide, will line 25,5 yards of quarter cloth? *answer* 42,5 *yds.*

A had 40,7 yards of linen, for which B gave him 25,6 of Holland, valued at 4,5*s.* per ell; how was A's linen d per yard? *answer* 2*s* 9*d.* 3,8*qr.*

How many dollars of 7,5*s.* each, should be given in exnge for 100 French guineas, at 34,5*s*? *answer* 460

What sum has A at interest, when it yields as much ½ months, as B's 450*l.* do in 15? *answer* 900*l.*

E DOUBLE RULE OF THREE IN DECIMALS.

uestions in this rule are wrought as in whole numbers, ing the points agreeably to the preceding directions.

EXAMPLES.

If 3 men receive 8,9*l.* for 19,5 days labour; how much 20 men have for 100,25 days?

If $\left.\begin{array}{r}3M.\\ 19,5da.\end{array}\right\} 8,9l. \left\{\begin{array}{c}20M.\\ 100,25da.\end{array}\right\}$ *answer* £.305 0 8,2

2 If 2 persons receive 4,625*s.* for 1 day's labour, how much should 4 persons have for the work of 10,5 days?

answer 4*l* 17*s* 1*d*.½

3 If 16*s* 4*d.* be the porterage of 5,25 hundred weight for 20 miles; what must be paid for carrying 17,75 hundred weight 7,5 miles? *answer* 1*l* 0*s* 8*d*.½

4 How many men should reap 417,6 acres in 12 days, when 5 persons cut down ⅛ of that quantity in half the time?

answer 20 men.

5 Suppose the interest of 76,94*l.* for 9,5 months to be 15,25*l.* what principal will gain 6*l.* in 12,75 months?

answer 22*l* 11*s* 1*d*.¼

6 When 12 oxen graze down 16,25 acres; in 20 days; how much, of like pasture, would suffice 24 such cattle for 100 days? *answer* 162,5 acres.

7 What money, at 3½ per cent. per annum, will clear 38*l* 10*s.* in a year and a quarter? *answer* 880*l.*

8 A cellar which is 22,5*ft.* long, 17,3 wide, and 10,25 deep, being dug in 2½ days, by six men, working 12,3 hours a day; how many days, of 8,2 hours, should 9 men take to excavate one which measures 45, by 34,6 by 12,3 feet?

answer 12 days.

INVOLUTION; OR THE RAISING OF POWERS.

A POWER is the product arising from multiplying any given number into itself continually a certain number of times; thus,

2×2= 4 is the second power, or square of 2.
2×2×2= 8 the third power, or cube of 2.
2×2×2×2=16 the fourth power of 2, &c.

The number denoting the power is called the index, or the exponent of that power.

If two or more powers are multiplied together, their product is that power whose index is the sum of the exponents of the factors; thus,

2×2=4 the square of 2; 4×4=16=4th power of 2; and 16×16=256=8th power of 2, &c.

TABLE of the first nine Powers.

Roots	*Squares*	*Cubes*	*4th power*	*5th power*	*6th power*	*7th power*	*8th power*	*9th power*
1	1	1	1	1	1	1	1	1
2	4	8	16	32	64	128	256	512
3	9	27	81	243	729	2187	6561	19683
4	16	64	256	1024	4096	16384	65536	262144
5	25	125	625	3125	15625	78125	390625	1953125
6	36	216	1296	7776	46656	279936	1679616	10077696
7	49	343	2401	16807	117649	823543	5764801	40353607
8	64	512	4096	32768	262144	2097152	16777216	134217728
9	81	729	6561	59049	531441	4782969	43046721	387420489

EXAMPLES.

1 What is the fifth power of 7?
$7 \times 7 \times 7 \times 7 \times 7 = 16807 =$ fifth power.
2 What is the third power or cube of 35?
answer 42875
3 What is the fourth power of $\frac{3}{4}$? [illegible]
4 What is the fifth power of ,029? ,000000020511149.
5 What is the sixth power of 5,03?
answer 16196,005304479729.
6 What is the eighth power of $3\frac{2}{5}$? $17857\frac{366816}{390625}$.

EVOLUTION: OR THE EXTRACTING OF ROOTS.

THE root of any number, or power, is such a number, as, being multiplied into itself a certain number of times, will produce that power. Thus 2 is the square root of 4, because $2 \times 2 = 4$; and 4 is the cube root of 64, because $4 \times 4 \times 4 = 64$, and so on.

THE SQUARE ROOT.

THE square of a number is the product arising from that number multiplied into itself.

Extraction of the square root is the finding of such a number, as, being multiplied by itself, will produce the number proposed.

RULE.

1. Distinguish the given number into periods of two figures each, beginning at the units place, or decimal point; and when the decimal does not consist of an even number of figures, annex a cipher; and equal to the periods of whole numbers and decimals respectively, will be the places of each in the root.

2. Deduct from the first period the greatest square it contains, setting the root thereof as a quotient figure, and doubling it for a divisor; and bring down the second period to the remainder, for a dividual.

3. Try how often the said divisor, with the resulting figure of this trial, thereto annexed, are contained in the dividual, and set this resulting figure to both divisor and root; then multiply and subtract as in division, and bring down the next period.

4. Double the ascertained root for a new divisor, and repeat the process to the end.

PROOF.

Square the root, adding in the remainder (if any) which will equal the number given.

EXAMPLES.

1 What is the square root of 30138,696025?

```
            , , , , , ,
           30138,696025(173,605 answer.
           1
       27)201
           189
      343)1238
           1029
      3466)20969
            20796
   347205)1736025
          1736025
               0
```

Note. When one more than half the figures of the root are found, the reſt may be obtained by working as in contracted diviſion of decimals.

2 Required the square-root of 14876,2357?

14876,2357(121,968175
1

22)48
44

241)476
241

2429)23523
21861

24386)166257
146316

24392)19941(8175
427
183
13
1

3 Required the square root of 5499025? *facit* 2345
4 What is the square-root of 74770609? *answer* 8647
5 What is the square-root of 368863? 607,34092+
6 What is the square-root of 3271,4007? 57,19+
7 What is the square-root of 2,2710957? 1,50701+
8 What is the square-root of 10? 3,162277+
9 What is the square-root of ,0003272481? ,01809
10 Required the side of a square acre of land? *facit* 12,649+*per.*

11 A certain number of men gave 30*s* 1*d.* for a charitable purpose; each man giving as many pence as there were men; query the number? *answer* 19 men.

12 If a circular pipe of 1,5 inches diameter, fill a ciſtern in 5 hours; in what time would it be filled by one of 3,5 inches diameter? *answer* 55*min.* 6*sec.*

13 If 484 trees be planted in a square orchard, how many must be in a row each way? *answer* 22

Note 1. The ſquare of the longeſt ſide of a right angled triangle is equal to the ſum of the ſquares of the other two ſides; and conſequently the difference of the ſquare of the longeſt, and either of the other, is the ſquare of the remaining ſide.

2. The ſquare root of a vulgar fraction is found by reducing it to its loweſt terms, and extracting the root of the numerator, for a numerator, and of the denominator, for a denominator. If it be a ſurd, reduce it to its equivalent decimal, &c.

3. A mixt number may be reduced to an improper fraction, or a decimal, and the root thereof extracted as before.

14 The wall of a fortress is 17 feet high, which is surrounded by a moat 20 feet in breadth; query the length of a ladder to reach from the outside of the moat to the top of the wall? *answer* 26.2 feet.

15 A line of 36 yards long will exactly reach from the top of a fort to the opposite bank of a river, known to be 24 yards broad; the height of the wall is required? *answer* 26.83+ yards.

16 Suppose a ladder 60 feet long be so planted as to reach a window 37 feet from the ground on one side of the street, and without moving it at the foot, will reach a window 23 feet high on the other side; what breadth was the street of? *answer* 103,64 feet.

17 What is the square-root of $\frac{2044}{6845}$?	*answer* $\frac{2}{3}$
18 What is the square-root of $\frac{7056}{9216}$?	$\frac{7}{8}$
19 What is the square-root of $\frac{3164}{6192}$?	,71528
20 What is the square root of $37\frac{36}{49}$?	$6\frac{1}{7}$
21 What is the square-root of $17\frac{16}{25}$?	$4\frac{1}{5}$
22 What is the square-root of $76\frac{14}{17}$?	8,7649+

THE CUBE ROOT.

THE Cube of a number is the product of that number multiplied into its square.

Extraction of the cube root is the finding of such a number, as, being multiplied into its square, will produce the number proposed.

RULE.

First, Distinguish the proposed number into periods of three figures each, beginning at the units place, or decimal point;

point: and when the decimal does not consist of a complete period or periods, annex a cipher or ciphers to make it so; and the places of the root will be as many as the periods of the given cube in whole numbers and decimals respectively.

Secondly, Find the great root of the left hand period, which place to the right of the given number, and subtract the cube thereof from said period; and to the remainder bring down the next period for a dividual.

Thirdly, Take the triple square of the ascertained root for a defective divisor.

Fourthly, Reverse mentally the units and tens of the dividual, and try how often the defective divisor is contained in the rest; place the result of this trial to the root, and its square to the right of said divisor, supplying the place of tens with a cipher, if the square be less than 10

Fifthly, Complete the divisor, by adding thereto the product of the last figure of the root by the rest, and by 30.

Sixthly, Multiply, subtract, and bring down the next period for a dividual, for which find a divisor as before; and so proceed with every period.

Note. Defective divisors, after the first, may be more concisely found by addition, thus: To the last complete divisor, add the number which completed it, with twice the square of the last figure in the root; the sum will be the next defective divisor.

EXAMPLES.

1 What is the cube root of 444194,947?

444194,947(763 *ans.*
343

{Defec. div. & sqr. of 6=14736)101194
{+1260=complete divisor 15996) 95976

{Defec. div. & sqr. of 3=1732809)5218947
{+6840=complete divisor 1739649)5218947

0

2 What is the cube-root of 34328125? *answer* 325
3 What is the cube-root of 84604519? 439
4 What is the cube-root of 259694072? 638
5 What is the cube-root of 22069810125? 2805
6 What is the cube-root of 673373097125? 8765
7 What is the cube-root of 12,977875? 2,35
8 What is the cube-root of ,001906624? ,124
9 What is the cube-root of 15926,972504? 25,16+
10 What is the cube-root of 171,46776406? 5,555+

11 What is the difference between half a solid foot, and a solid half foot? *answer* 3 half feet.

12 In a cubical foot, how many cubes of 6 inches, and how many of three, are contained therein?
answer 8 of 6*in.* and 64 of 3*in.*

13 The content of an oblong cellar is 1953,125 cubic feet; required the side of a cubical cellar that shall contain just as much? *answer* 12,5 feet.

14 A stone of a cubic form contains 474552 solid inches; what is the superficial content of one of its sides?
answer 6084 inches.

15 A merchant laid out 691*l* 4*s.* in cloths, but forgot the number of pieces purchased, also how many yards were in each piece, and what they cost him per yard; but remembers, that they cost him as many shillings per yard as there were yards in each piece, and that there was just as many pieces; query the number purchased? *answer* 24

Note 1. The cube root of a vulgar fraction is found by reducing it to its lowest terms and extracting the root of the numerator for a numerator, and of the denominator for a denominator. If it be a surd, extract the root of its equivalent decimal.

2. A mixt number may be reduced to an improper fraction, or a decimal, and the root thereof extracted.

16 What is the cube-root of $\frac{352}{1188}$? *ans.* $\frac{2}{3}$
17 What is the cube-root of $\frac{648}{10125}$? $\frac{2}{5}$
18 What is the cube-root of $\frac{4}{9}$? ,763
19 What is the cube-root of $\frac{5}{7}$? ,949+
20 What is the cube-root of $13\frac{2}{3}$? 2,3908+
21 What is the cube-root of $42\frac{21}{24}$? $3\frac{1}{2}$
22 What is the cube-root of $5\frac{104}{125}$? $1\frac{4}{5}$
23 What is the cube-root of $405\frac{28}{125}$? $7\frac{2}{5}$
24 What is the cube-root of $7\frac{1}{5}$? 1,966+
25 What is the cube-root of $9\frac{1}{6}$? 2,092+

GENERAL

GENERAL RULE FOR EXTRACTING THE ROOTS OF ALL POWERS.

FIRST, if the index of the power be even, extract the square-root of the given number; whereby it will be depressed to a power half as high; or, if the index will divide by 3 without remainder, take the cube root for a power ⅓ as high; thus proceed till the required root be obtained, or an odd power result, the index of which will not divide evenly by 3.

II. The root of ſuch an odd power may be extracted thus:

First, Beginning at units, point the given number into periods of as many figures each as are expressed by its index.

Secondly, Find such a figure or figures, by the table of powers or by trial, as will be nearest the first of the root, whether greater or less.

Thirdly, Involve the part of the root so found to the power, and take the difference between this power and as many periods of the given number as there are figures obtained of the root, and multiply this difference by the ſaid figures for a dividend.

Fourthly, Multiply the sum of the same periods and power by the integral half of the index (*i. e.* for a 5th power, by 2, a 7th. by 3, &c), and to the product add the said power for a diviſor.

Fifthly, Apply the quotient, as a correction to the part of the root before found, by addition or subtraction, accordingly as that part is less or more than just.

Sixthly, Repeat the operation, if greater accuracy, or more figures in the root be desired; using the root so corrected instead of the figure or figures first found, &c.

EXAMPLES.

1. What is the 5th root of 1,2461819?

```
          1,24618
          1,00000
          -------
          2,24618   1,2461819(1,0
                2   1,00000      ,045
          -------   -------
          4,49236    ,24618    1,045 Root.
          1,00000         1,0
          -------   -------
Divide    5,49236   ),24618,0(,045
                      2197
                      ----
                       265
                       275
```

2 What is the cube root of $\frac{1}{2}$? *answer* ,7937005

3 What is the fourth root of 97,41? 3,1415999

4 What is the sixth root of 21035,8? 5,254037

5 What is the seventh root of 34487717467307513182 492153794673? *answer* 32017

6 What is the eighth root of 1121016281320476236246 4 97942460481? *answer* 13527

7 What is the ninth root of 976379602989073960279 6 30298890? *answer* 2148,7201

8 What is the 365th root of 1.05? 1.0001336

ARITHMETICAL PROGRESSION.

ARITHMETICAL Progression is a rank, or series of numbers, which increase or decrease by a common difference, in which five particulars are to be observed, viz.

First, The first term;
Secondly, The common excess, or difference;
Thirdly, The last term;
Fourthly, The number of terms;
Fifthly, The sum of all the terms.

Note. *In any series of numbers in arithmetical progression the sum of the two extremes will be equal to the sum of any two terms equally distant therefrom: as*, 2, 4, 6, 8, 10, 12; *where* 2+12=14; *so* 4+10=14; *and* 6+8=14; *or* 3, 6, 9, 12, 15; *where* 3+15=18; *also* 6+12=18; and 9+9=18.

CASE 1.

The first term, common difference, and number of terms given, to find the last term, and sum of all the terms;

RULE.

First, Multiply the number of terms, less 1, by the common difference, and to that product add the first term, the sum is the last term.

Secondly, Multiply the sum of the two extremes by the number of terms, and half the product will be the sum of the series.

EXAMPLES.

EXAMPLES.

1. Bought 19 yards of shalloon, at 1*d.* for the first yard, 3*d.* for the second, 5*d.* for the third &c. increasing 2*d.* every yard; what did they amount to?

19—1=18 1+37=38
2 19 number of terms.
36 342
+ 1 38
The last term 37 2)722
12)361 sum of the terms.
2,0)3,0 1
£. 1 10 1 *answer.*

2 Sixteen persons bestowed charity to a poor man; the first gave 5*d.* the second 9*d.* and so on in arithmetical progression; what did the last person give; and what sum did the indigent person receive?

answer the last gave 5*s* 5*d.* sum received 2*l* 6*s* 8*d.*

3 A merchant sold 100 yards of cloth; for the first yard he received 1*s.* for the second 2*s.* for the third 3*s.* &c. what sum did he receive? *answer* 252*l* 10*s.*

4 Admit 100 stones were laid two yards distant from each other in a right line, and a basket placed two yards from the first stone; what distance must a person travel, to gather them singly into the basket? *answer* 11*M.* 3*fur.* 180*yd.*

5 Sold 54 yards of cloth; the price of the first yard was 2*s.* of the second 5*s.* &c. what was the price of the last yard, and sum for all?

answer { the last *yd.* 8*l* 1*s.*
whole sum 220*l* 1*s.*

6 H covenanted with K to serve him 14 years, and to have 5*l.* the first year, and his wages to encrease annually 2*l.* during the term, what had he the last year, what on an average yearly, and what for the whole time?

answer { 31*l.* the last year.
18*l.* annually.
252*l.* whole time.

CASE

CASE 2.

When the two extremes and number of terms are given, and the common difference of all the terms required;

RULE.

Divide the difference of the extremes by the number of terms, less one, the quotient will be the common difference.

EXAMPLES.

1 Admit a debt be discharged at 16 several payments in arithmetical progression; the first to be 14*l.* the last 100*l.* what is the common difference, and what each payment, and the whole debt?

	£.	s.	d.	
$\frac{100-14}{16-1}=$	5	14	8	common difference.
	14	0	0	the first payment.
	19	14	8	= second.
	25	9	4	= third, &c.

$14+100\times8=912$*l.* the whole debt.

2 A man had 10 sons, whose several ages differed alike; the youngest was 3 years old, and the eldest 48; what was the common difference of their ages? *answer* 5 years.

3 There are 21 persons, whose ages are equally distant from each other; the youngest is 20 years old, and the eldest 60; what is the common difference of their ages, and the age of each person? *answer* Common difference 2 years.

20 the age of the first person.
$20+2=22$ of the second.
$22+2=24$ of the third, &c.

4 A footman is to travel from Philadelphia to a certain place in 19 days, and to go but six miles the first day, increasing every day by an equal excess, so that the last day's journey may be 60 miles; what is the common difference, and distance of the journey?

answer $\left\{\begin{array}{ll}\text{Common difference} & 3\\ \text{Distance} & 627\end{array}\right\}$ miles.

GEOMETRICAL PROGRESSION.

GEOMETRICAL Progression is a series of numbers, increasing by a common multiplier, or decreasing by a common divisor, called the ratio; as, 2, 4, 8, 16, 32, &c. increase by the multiplier 2; and 32, 16, 8, 4, 2, decrease continually by the divisor 2, &c.

The last term and sum of the series are found by this

RULE.

Raise the ratio to the power whose index is one less than the number of terms given, which multiply by the first term, that product is the last term or greater extreme.

Multiply the last term by the ratio, from the product subtract the first term, and divide the remainder by the ratio less one; the quotient will be the sum of the series.

EXAMPLES.

1 Sold 24 yards of Holland, at 2*d.* for the first yard, 4*d.* the second, 8*d.* the third, &c. in a duplicate proportion; how much do they amount to?

```
1 2 3  4 indices,
2 4 8 16 leading terms.
      16
     ---
     256 8th term.
     256
   -----
   65536 16th term.
     256
--------
16777216 24th last term.
       2 ratio.
--------
33554432
       2 first term.
--------
12)33554430 sum of the series.
   --------
2,0)279620,2  6
    -----------
answer £. 139810,2  6
```

2 Bought 30 bushels of wheat; the first bushel for 2*d.* the second 4*d* the third 8*d.* doubling the price of each preceeding bushel for that of the next; query the amount, and price per bushel at an average?

answer { 8947848*l* 10*s* 6*d.* Amount.
298261*l* 12*s* 4*d.* per Bushel.

3 Sold 15 yards of sattin, the first yard for 1*s.* the second for 2*s.* the third for 4*s.* &c. what sum did they amount to? *answer* 1638*l* 7*s.*

4 Admit a goldsmith sold one *lb* of gold, at one farthing for the first ounce, a penny for the second, 4*d.* for the third, &c. in a quadruple proportion; what did it amount to? and what did he gain by it, supposing it cost him 4*l.* per ounce?

answer { 5825*l* 8*s* 5*d.* $\frac{1}{4}$ Sold for.
5777*l* 8*s* 5*d.* $\frac{1}{4}$ Gained.

5 What sum would purchase a horse with 4 shoes, and 8 nails in each shoe, at one farthing for the first nail, a halfpenny for the second, a penny for the third, &c. doubling to the last? *answer* 4473924*l.* 5*s* 3*d.* $\frac{3}{4}$

6 Suppose a man wrought 20 days, and received for the first day 4 barley corns, for the second 12, for the third 36, &c. in a triple proportion; what did the twenty days labour come to, rating the barley at 2*s* 6*d.* per bushel?

answer 1773*l* 7*s* 6*d.*

Note. 7680 wheat, or barley corns, are ſuppoſed to make a pint.

7 Sold 30 yards of velvet, at 2 pins for the first yard, 6 for the second, 18 for the third, &c. and these disposed of at one farthing per 100, how much did the velvet amount to? And whether did the seller gain or lose, and how much, supposing the prime cost of the velvet at 50*l.* per yard?

answer { 2144699292*l.* 13*s* 0*d.* $\frac{1}{2}$ Amount.
2144697792*l* 13*s* 0*d* $\frac{1}{2}$ Gained.

8 A certain person married his daughter on new year's day, and gave her one guinea towards her portion, promising to double it on the first day of every month for one year; what was her portion in sterling money?

answer 4299*l* 15*s.*

SIMPLE INTEREST—BY DECIMALS.

Note. *The ratio is the Interest of 1l. for one year, and is thus found.*

£. £. £. £.
As {100..5 :: 1..,05
100..5,5 :: 1..,055
100..6 :: 1..,06 &c.

Which is only dividing the rate per cent. by 100, by moving the point 2 places to the left.

A TABLE of Ratios.

Rate per Cent.	*Ratio.*	*Rate per Cent.*	*Ratio.*
2	.02	6½	.065
3	.03	7	.07
3½	.035	7½	.075
4	.04	8	.08
4½	.045	8½	.085
5	.05	9	.09
5½	.055	9½	.095
6	.06	10	.1

The principal, time, and ratio given, to find the interest, and amount?

RULE.

Multiply the principal, time, and ratio together, the last product will be the interest, commission, brokage, &c. to which add the principal, and the sum will be the amount.

Note. In operations of intereſt by decimals, the money ſhould be in the denominations of pounds, or dollars, and the time in years, with their parts (if any) annexed decimally.

EXAMPLES.

1 Required the amount of 537*l* 10*s*. at 6 per cent. per annum for 5 years?

Principal 537,5 × 5 × ,06 = 161,25 Interest.
537,5 Principal.
£. 698,75 = 698*l* 15*s*. answer.

2 What is the interest of 917*l* 16*s*. at 5 per cent. per annum for 7 years? *answer* 221*l* 4*s* 7*d*.

3 If my correspondent be to have $4\frac{1}{2}$ per cent. what will his commission on 391*l* 17*s*. come to? *ans.* 17*l* 12*s* 7*d*.$\frac{1}{7}$+

4 What will be the interest and amount of 567*l* 10*s*. in 9 years, at 6 per cent. per annum?

answer { 306*l* 9*s*. Interest.
873*l* 19*s*. Amount.

5 What is the interest of 4726*l* 18*s* 6*d*.$\frac{1}{2}$ for $3\frac{1}{2}$ years, at 7 per cent. per annum? *answer* 1158*l* 1*s* 11*d*.

6 What will 9526*l* 12*s*. 9*d*. amount to in 12 years and 9 months, at 7 per cent. per annum? *answer* 18029*l* 3*s* 2*d*.$\frac{3}{4}$

ALLIGATION.

ALLIGATION is a rule for adjusting the prices and simples of compound quantities.

CASE 1.

When several simple quantities, and their prices, are given, and a mean price of any part of the compound is required.

RULE.

As the sum of the several quantities,
Is to their total value;
So is any part of the composition,
To its value.

EXAMPLES.

1 If 19 bushels of wheat at 6*s*. the bushel, 40 of rye at 4*s*. and 12 of barley at 3*s*. be mixt together; what is a bushel of this mixture worth?

```
B.     s.
19 at 6=114
40 at 4=160
12 at 3= 36
——     ——  s.  d.
71    )310(4   4¼ answer.
```

2 A grocer mixed sugars; 2*C.wt.* at 56*s*. 1*C.wt.* at 43*s*. and 2*C.wt.* at 50*s*. per *C.wt.* what is 3*C.wt.* of this mixture worth? *answer* 7*l* 13*s*.

3 If 4*oz.* of silver, worth 5*s.* the ounce, be melted with 8*oz.* at 4*s.* what is one ounce of this mixture worth?

answer 4*s* 4*d.*

4 A wine merchant mixes 12 gallons of wine at 4*s* 10*d.* the gallon, with 24 gallons, at 5*s* 6*d.* and 16 at 6*s* 3*d.*$\frac{1}{4}$; what is a gallon of this mixture worth? *answer* 5*s* 7*d.*

5 A goldsmith melted together 8*oz.* of gold of 22 carats fine, 1*lb.* 8*oz.* of 21 carats fine, and 10*oz.* of 18 carats fine; what is the quality or fineness of the composition?

answer 20 $\frac{8}{19}$ carats fine.

6 A refiner melted 5*lb.* of silver bullion of 8*oz.* fine, with 10*lb* of 7*oz.* and 15*lb.* of 6*oz* fine; of what fineness is 1*lb.* of this mass? *answer* 6*oz.* 13*dwt.* 8*gr.* fine.

CASE 2.

When the prices of several simples are given, to find how much of each, at their respective rates, must be taken, to make a compound at any proposed price;

RULE.

Write the rates of the simples under each other; link each rate, which is less than the mean rate, with one or more that is greater; the difference or sum of the differences, between each rate and the mean price, placed opposite the respective rate or rates, with which it is linked, will be the several quantities required.

Note 1. If all the given prices be greater, or less than the mean rate, they must be linked to a cipher.

2. Different modes of linking will produce different answers.

EXAMPLES.

1 How much rye at 4*s.* the bushel, barley at 3*s.* and oats at 2*s.* will make a mixture worth 2*s* 6*d.* the bushel?

$$\text{Mean rate } 30\left\{\begin{array}{l}48\\36\\24\end{array}\right.\quad\left.\begin{array}{rl}6 & \text{at } 4\\6 & 3\\18+6=24 & 2\end{array}\right\}\textit{answer.}$$

2 Canary at 2*s.* a quart, Sherry at 16*d.* and Malaga at 1*s.* how much of each must be taken, that the mixture may be worth 1*s* 6*d.* the quart?

$$\textit{answer}\left\{\begin{array}{ll}8 & \text{quarts of Canary,}\\6 & \text{Sherry, and}\\6 & \text{Malaga.}\end{array}\right.$$

3 A druggist has several sorts of tea, viz, at 12*s.* per *lb.* at 11*s.* at 9*s.* and at 8*s.* how much of each sort must be taken, to be sold at 10*s.* per *lb.*

	lb.		*s.p.lb.*		*lb.*		*s.p.lb.*		*lb.*		*s.p.lb.*
1 *ans.*	2	at	12	2 *ans.*	3	at	12	3 *ans.*	1	at	12
	1		11		2		11		2		11
	1		9		2		9		2		9
	2		8		3		8		1		8

	lb.		*s.p.lb.*		*lb.*		*s.p.lb.*		*lb.*		*s.p.lb.*
4 *ans.*	1	at	12	5 *ans.*	3	at	12	6 *ans.*	2	at	12
	3		11		1		11		3		11
	3		9		3		9		1		9
	1		8		1		8		3		8

7 *answer* 3*lb.* of each sort.

4 How much sugar at 4*d.* at 6*d.* and at 11*d.* per pound, must be mixed together, so that the composition may be worth 7*d.* per *lb.*

answer 1*lb.* or 1 *C.wt.* of each, or any other weight of equal quantity.

5 It is required to mix several sorts of wine, at 3*s.* 5*s.* and 7*s.* per gallon, with water, that the mixture may be worth 4*s.* per gallon; how much of each sort must the mixture consist of?

answer 1 gal. wine at 3*s.* 1 ditto at 5*s.* 4 ditto at 7*s.* and 3 gals. water.

CASE 3.

When the rate of all the simples, the quantity of one of them, and the compound rate of the whole mixture are given, to find the several quantities of the rest;

RULE.

Place the mean rate, and the several prices, and take their differences, as in case 2; then,

As the differences of the same name with the quantity given,

Is to rest of the differences respectively;

So is the quantity given,

To the several quantities required.

EXAMPLES.

1 A merchant has 40*lb.* of tea, at 6*s.* per *lb.* which he would mix with some at 5*s* 8*d.* at 5*s* 2*d.* and 4*s* 6*d.* per *lb.* how much of each sort must he take, to mix with the 40*lb.* that he may sell the mixture at 5*s* 5*d.* per *lb.*

$$65\begin{cases}54 & - \quad 3+7=10\\ 62 & - \quad 3+7=10\\ 68 & - \quad 11+3=14\\ 72 & - \quad 11+3=14\end{cases}$$

against the price of the quantity given.

$$\text{As } 14 : \begin{Bmatrix}10 : \\ 40\end{Bmatrix} 40 : \begin{Bmatrix}28 \text{ at } 4s\ 6d. \text{ and } 5s.2d. \text{ per } lb\\ 40 \text{ at } 5s.8d. \qquad\qquad \text{ per } lb.\end{Bmatrix} \textit{ans.}$$

2 How much barley at 2*s* 6*d.* rye at 3*s.* and wheat at 4*s.* per bushel, must be mixed with 12 bushels of oats, at 18*d.* per bushel, that the whole may rate at 1*s* 10*d.* per bushel?

answer 1 bushel of each.

3 How much gold of 16, 20, and 24 carats fine, and how much alloy, must be mixed with 10*oz.* of 18 carats fine, that the composition may be 22 carats fine?

answer 10*oz* of 16 carats fine, 10 of 20, 170 of 24 and 10 of alloy.

4 Ten bushels of wheat, at 4*s.* per bushel, with rye at 3*s.* barley at 2*s.* and oats at 1*s.* what quantity of these must be mixed with the wheat to rate at 2*s* 4*d.* per bushel?

1 *ans.*	2*bu.* 2*p.* of rye, 5 barley, 12 2 oats.	2 *ans.*	40*bu* of rye, 50 barley, 20 oats.
3 *ans.*	8*bu.* of rye, 10 barley, 14 oats.	4 *ans.*	10*bu* of rye, 14 barley, 14 oats.
5 *ans.*	12*bu.* 2*p.* of rye, 5 barley, 17 2 oats.	6 *ans.*	2*bu.* of rye, 14 barley, 10 oats.
7 *ans.*	50*bu.* of rye, 70 barley, 20 oats.		

CASE 4.

When the rates of the several simples, the quantity to be compounded, and the mean rate thereof are given, to find the quantity of each simple;

RULE.

RULE.

Link the several prices, and place their differences as before; then,

As the sum of the differences,
Is to the quantity to be compounded;
So is the difference opposite each rate,
To the required quantity of that price.

EXAMPLES.

1 A brewer had 3 sorts of beer, viz. at 10*d.* 8*d.* and 6*d.* per gallon; how much of each sort must he take, to make 30 gallons, worth 7*d.* per gallon?

$$7d.\left\{\begin{array}{l}10\\ 8\\ 6\end{array}\right. \quad \begin{array}{r}1\\ 1\\ 3+1=4\\ \hline 6\end{array}$$

As 6 .. 30::1 to 5 *gals.* at 10*d.*&8*d.*
6 .. 30::4 to 20 at 6*d.*
answer.

2 A druggist compounds medicines, at 4*s.* 5*s.* and 8*s.* per *lb.* to make two parcels, one of 21*lb.* at 6*s.* the other of 35*lb.* at 7*s.* per *lb.* what quantity of each must be taken?

$$\textit{answer}\left\{\begin{array}{ll}6lb. & \text{at } 4s.\\ 6 & 5\\ 9 & 8\end{array}\right\}=21lb.\ \text{at } 6s.\ \&\left\{\begin{array}{ll}5lb. & \text{at } 4s.\\ 5 & 5\\ 25 & 8\end{array}\right.$$

=35*lb.* at 7*s.* per *lb.*

3 A merchant had 4 sorts of coffee, at 8*d.* 12*d.* 18*d.* and 22*d.* per *lb.* the worst would not sell, and the best was too dear, he therefore concluded to mix 120*lb.* what quantity of each must he take, so as to sell at 16*d.* per *lb*?

answer 36*lb.* at 8*d.* 12 at 12*d.* 24 at 18*d.* and 48 at 22*d.*

4 How many gallons of water must be mixed with wine, at 4*s.* per gallon, so as to fill a vessel of 80 gallons, that may be afforded at 2*s* 9*d.* per gallon?

answer 25 gallons of water with 55 of wine.

5 A goldsmith has gold of 15, 17, 20 and 22 carats fine, and would melt together of each of these so much, as to make a mass of 40*oz.* of 18 carats fine; how much of each sort is necessary?

answer 16*oz.* of 15, 4 of 17, 8 of 20 & 12 of 22 carats fine

POSITION.

POSITION.

POSITION is a rule for finding an unknown number, by one or more supposed numbers; and is either single or double.

SINGLE POSITION.

Single position teaches to resolve such questions as require only one supposed number.

RULE.

Work with a supposed number according to the tenor of the question; then,

As the result of that operation,
Is to the supposed number;
So is the number given,
To that required.

PROOF.

Work with the answer according to the tenor of the question, and the result must equal the given number.

Note. If the reſults of two or more ſuppoſed numbers be in the ſame proportion as the numbers ſuppoſed; or

If upon working with two ſuppoſed numbers, and multiplying each of them by the result of the other, the products be equal, then the queſtion may be ſolved by *ſingle* poſition, otherwiſe not.

EXAMPLES.

1 A person, after spending $\frac{1}{3}$ and $\frac{1}{4}$ of his money, had 60*l.* left; what had he at first?

£. £. £. £. £.
Suppose 24 As 10 ·· 24 :: 60 ·· 144 *answer.*

	24	144
	$\frac{1}{3}=8$	$\frac{1}{3}=48$
	$\frac{1}{4}=6$	$\frac{1}{4}=36$
	14	84
Result	10	60 Proof.

2 B's age is 1$\frac{1}{2}$ A's; C's twice B's, both with A's make 132 years; how old is each of them?

answer A 24, B 36, and C 72 years.

3 .

3 What sum is that, of which the $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{1}{6}$ make 74. *answer* 120*l.*

4 What sum of money, at 6 per cent. per annum simple interest will amount to 500*l.* in 10 years? *answer* 312*l* 10*s.*

5 Three unequal vents will severally empty a vessel of 120 gallons in 1 hour, 2 hours, and 3 hours; if running together, what time is necessary? *answer* 32*min.* 43 $\frac{7}{11}$ *sec.*

6 Of a certain sum given A $\frac{1}{3}$, B $\frac{1}{4}$, C $\frac{1}{6}$, and D the rest, which is 28*l.* the sum is required? *answer* 112*l.*

7 What is the age of a person who says, that if $\frac{3}{5}$ of the years I have lived be multiplied by 7, and $\frac{2}{3}$ of them be added to the product, the sum will be 292? *answer* 60 years.

8 Required the sum, the $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{5}$ of which made 94*l.* *answer* 120*l.*

9 What sum, at 6 per cent. per annum, will amount to 860*l.* in 12 years? *answer* 500*l.*

10 A person having about him a certain number of dollars, said, that $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{1}{6}$ of them would make 57; how many had he? *answer* 60.

11 A schoolmaster being asked how many scholars he had, answered, if to double the number I add $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ of them, I shall have 333; how many had he? *answer* 108

12 A saves $\frac{1}{3}$ of his income; but B, who has the same salary, by living twice as fast as A, sinks 50*l.* a year; how much then have they per annum? *answer* 150*l.* each.

13 The yearly interest of Charlotte's money, at 6 per cent. exceeds $\frac{1}{20}$ of the principal by an 100*l.* and she does not intend to marry any man, who is not scholar enough to tell her fortune; pray what is it; *answer* 10000*l.*

DOUBLE POSITION.

Double position teaches to solve such questions as require two supposed numbers in the operation.

RULE.

Suppose two numbers, and work with each agreeably to the tenor of the question, noting the errors of the results: multiply the errors of each operation into the supposed number of the other; then, If the errors be alike, *i. e.* both too much, or too little, take their difference for a divisor, and the difference of the product for a dividend: but if unlike, take their sum for a divisor, and the sum of the products for a dividend.

Note. In many inſtances, if 0 be uſed for the firſt and 1 for the ſecond of the ſuppoſed number, the firſt of the errors, divided by their difference will be the anſwer.

Proof as in single position.

EXAMPLES.

1 A farmer hired a labourer on this condition, that for every day he worked, he should receive 12*d.* but for every day he was idle he should be fined 8*d.* when 390 days were past, neither of them was indebted to the other; how many days did he work.

Suppose 1st. 140 working days, 2*d.* 150
390—140=250 idle 240
140×12= 1680 earned 150×12=1800
250× 8= 2000 fined 240× 8=1920
Error, too little 320 too little 120
150 140
320 48000 16800
120 16800
2|00)312|00
answer 156 days.

Or thus:

Suppose 1st. 0 working day 2d. 1
then 390 idle 389
0×12= 0 earned 1×12= 12
390× 8= 3120 fined 389× 8=3112
Error too little 3120 too little 3100
3100
2|0)312|0
answer 156 days.

2 Divide 100*l.* so that B may have twice as much as A, wanting 8*l.* and C three times as much, wanting 15*l.* what is each man's share?

answer A 20*l* 10*s.* B 33*l.* C 46*l* 10*s.*

3 Of 100*l.* expenditures, B paid 10*l.* more than A, and C as much as A and B; each man's part is required?

answer A 20*l.* B 30*l.* C 50*l.*

4 A is 20 years of age: B's age is A's and half C's, and C's equals them both; their several ages are required?

answer A 20, B 60, C 80 years.

5 The head of a fish is 9 inches long, and its tail is as long as its head and half the body, and the length of the body equal those of the head and tail; what is its whole length?

answer 6 feet.

6 A labourer hired for 40 days upon this condition, that he should receive 20*d.* for every day he wrought, and forfeit 10*d.* for every day he was idle; at settlement he received 2*l* 1*s* 8*d.* how many days did he work, and how many was he idle? *answer* wrought 30 days, idle 10.

7 Bought 15 yards for 3*l* 10*s.* viz. damask at 8*s.* per yard, and lining for it, at 3*s.* per yard; what quantity was there of each?

answer $\begin{cases}\text{5 yards damask.}\\ \text{10 ditto lining.}\end{cases}$

8 A and B put equal sums of money in trade; A gained a sum equal to $\frac{1}{4}$ of his stock, and B lost 225*l.* then A's money was double that of B's; what capital did each of them begin with? *answer* 600*l.*

9 When first the marriage knot was ty'd
Between my wife and me [illegible] 9 4 11
My age [illegible]
336 5 1 7 4

---

1 Five floors in a certain building contain each 1295*f.* 9*i.* 8″ how many feet in all? *answer* 6479*f.* 0*i.* 4″.

2 Several boards measure as follow: viz. 27*f.* 3*i.* 25*f.* 11*i.* 23*f.* 10*i.* 20*f.* 9*i.* 20*f.* 6*i.* and 18*f.* 5*i.* what number of feet do they contain? *answer* 136*f.* 8*i.*

SUBTRACTION OF DUODECIMALS.

RULE.

Work as in compound subtraction, borrowing 12, when necessary.

PERMUTATION.

PERMUTATION is a rule for finding how many different ways any given number of things may be varied in position, or succession; thus, abc, acb, bac, bca, cab, cba, are six different positions of three letters.

RULE.

Multiply all the terms of the natural series continually from 1 to the given number inclusive, the last product will be the changes required.

EXAMPLES.

1 In how many different positions can 5 persons place themselves at a table? 1 × 2 × 3 × 4 × 5 = 120 *answer.*

2 What number of changes may be rung upon 12 bells, and in what time may they be rung, allowing 3 seconds to every round? *ans.* { 479001600 changes. 45 years, 195 days, 18 hours.

3 What time will it require for 8 persons to seat themselves every day differently at dinner? *ans.* 110*yr.* 142*days.*

4 What number of variations will the 26 letters of the alphabet admit of? *ans.* 403291461126605635584000000

COMBINATION.

COMBINATION discovers how many different ways a less number of things may be combined out of a greater; thus, out of the letters a, b, c, are three different [illegible]ns [illegible] two, [illegible]. ab, ac, bc.

Or thus: [illegible]

Suppose 1st. 0 working day
then 390 idle

0 × 12 = 0 earned
390 × 8 = 3120 fined

Error too little 3120
3100

2|0)312|0

answer 156 days.

2d. [illegible]it,
389 [illegible]

1 × 12 = 12
389 × 8 = 3112

too little 3100

2 What is the value of as many different dozens as may be chosen out of 24 at 1*d.* per dozen? *ans.* 11267*l* 6*s* 4*d.*

3 How many different ways may a butcher select 50 sheep out of a flock consisting of 100, so as not to make the same choice twice? *ans.* 1089130654487407925717249725 6

DUODECIMALS.

DUODECIMALS are fractions of a foot, or of an inch, or parts of an inch, having 12 for their denominator.

The denominations are:

12 Fourths ''''	make	1 Third '''
12 Thirds		1 Second ''
12 Seconds		1 Inch *I.*
12 Inches		1 Foot *Ft.*

ADDITION OF DUODECIMALS.

RULE.

Add as in compound addition, carrying one for each 12 to the next denomination.

EXAMPLES.

Ft.	*I.*	''	'''	''''
14	4	3	5	6
85	7	8	6	6
56	10	5	7	9
43	1	6	4	3
87	11	10	8	5
48	5	2	10	11
336	5	1	7	4

Ft.	*I.*	''	'''	''''
28	4	3	7	10
71	7	8	4	2
67	11	3	7	5
32	0	8	4	7
46	3	8	11	10
67	11	9	4	11

1 Five floors in a certain building contain each 1295*f.* 9*i.* 8'' how many feet in all? *answer* 6479*f.* 0*i.* 4''.

2 Several boards measure as follow: viz. 27*f.* 3*i.* 25*f.* 11*i.* 23*f.* 10*i.* 20*f.* 9*i.* 20*f.* 6*i.* and 18*f.* 5*i.* what number of feet do they contain? *answer* 136*f.* 8*i.*

SUBTRACTION OF DUODECIMALS.

RULE.

Work as in compound subtraction, borrowing 12, when necessary.

EXAMPLES.

	F.	I.	″	‴	⁗	Ft.	I.	″	‴	⁗
From	176	1	2	6	10	3786	10	1	6	7
Take	97	10	1	7	11	987	8	11	6	9
Rem.	78	3	0	10	11					

2 From a board measuring 41*ft.* 7*in.* cut 19*ft.* 10*in.* and what is left? *answer* 21*ft.* 9*in.*

MULTIPLICATION OF DUODECIMALS.

CASE 1.

When the feet of the multiplier do no exceed 12;

RULE.

Set the multiplier in such order that the feet thereof may stand under the lowest denomination of the multiplicand, and in multiplying carry one for every 12 from one denomination to another, and place the result of the lowest denomination in the multiplicand under its multiplier.

Note 1. If there be no feet in the multiplier, ſupply their place with a cipher.

2. Whether we begin with the higheſt or loweſt denomination of the multiplier, the ſeveral denominations of the products will be reſpectively synonymous with thoſe of the multiplicand under which they are placed.

EXAMPLES.

	Ft.	I.	
Multiply	7	9	
by 3*ft.*6*in.*		3	6
	3	10	6
	23	3	
Product	27	1	6

Ft.	I.	″		Ft.	I.	″
8	6	9	by	7	3	8

		7	3	8
	5	8	6	0
2	1	8	3	
59	11	3		
62	6	7	9	0

2 A mahogany board measures 28*ft.* 10*in.* 6″ by 3*ft.* 2*in.* 4″, what is its content? *answer* 92*ft.* 2*in.* 10″ 6‴ 0⁗

CASE 2.

When the feet of the multiplier exceed 12;

RULE.

Use the component parts of the feet in the multiplier as in compound multiplication, and take parts for the inches, &c.

EXAMPLES.

	Ft.	I.	''				Ft.	I.	''
Multiply	311	4	7	by			36	7	5
							6×6=36		

	1868	3	6		
			6		
	11209	9	0		
I. 6=½ -	155	8	3	6	
1=⅙ -	25	9	8	7	
'' 4=⅓ -	8	7	2	10	4
1=¼ -	2	1	9	8	7
Product	11402	0	0	7	11

2 A partition is 82*f.* 6*i.* by 13*f.* 3*i.* how many square feet does it contain? *answer* 1093*f.* 1*i.* 6''.

3 A floor is 79*f.* 8*i.* by 38*f.* 11*i.* how many square feet are therein? *answer* 3100*f.* 4*i.* 4''.

4 If a ceiling be 59*f.* 9*i.* long, and 24*f.* 6*i.* broad; how many yards does it contain? *answer* 162 yards 5*f.* +

5 There is a yard of 21,5 feet by 17,5 feet, which is to be paved with stones of 18 inches square; how many stones are necessary for the purpose? *answer* 167 +

6 Suppose the dimensions of a bale to be 7 feet 6 inches, 3 feet 3 inches, and 1 foot 10 inches; what is the solid content?

	ft.	*in.*	
	7	6	
	3	3	
ft. *in.*			
7 6×3ft.=	22	6	
7 6×3in.=	1	10	6
	24	4	6
	1	10	
ft. *in.* ''			
24 4 6×1 ft.=	24	4	6
24 4 6×10in.=	20	3	9
	44	8	3

answer 44 feet 8 inches and 3 twelfth parts.

2 What is the freight of a bale containing 65 feet 9 inches at 15 dollars per ton of 40 feet?

		dols.cts.	decimally.
		15,00 for 40 feet.	65,75
20 ft.	$\frac{1}{2}$	7,50	15
5 ft.	$\frac{1}{4}$	1,87,5	
6 in.	$\frac{1}{10}$	,18,7	32875
3 in.	$\frac{1}{2}$	,09,3	6575
		24,65,5	40)986,25
			*24,65,6

answer 24 dols. 65½ cts.

3 A merchant imports from London 6 bales of the following dimensions, viz.

	Length.		Height.		Depth.	
	ft.	*in.*	*ft.*	*in.*	*ft.*	*in.*
No. 1	2	10	2	4	1	9
2	2	10	2	6	1	3
3	3	6	2	2	1	8
4	2	10	2	8	1	9
5	2	10	2	6	1	9
6	2	11	2	8	1	8

What are the solid contents, and how much will the freight amount to, at 20 dollars per ton?

The contents are, viz.

	ft.	*in.*	*feet.*
No. 1	11	7	71,58
2	8	10	20 dols. per ton.
3	12	7	
4	13	2	40)1431,60
5	12	5	
6	13	0	35,79
	71	7	*answer* 35 dols. 79 cts.

To

To find Ship's Tonnage by Carpenter's Measure.

RULE.

For single decked vessels, multiply the length, breadth at the main beam, and depth of the hold together, and divide the product by 95.

EXAMPLE.

The length of a single decked vessel is 64 feet, breadth 22 feet, and depth 10 feet; what is the tonnage?

As 95 : 22×10 :: 64 : $148\frac{20}{95}$ tons, *answer.*

RULE.

For a double decked vessel, take half the breadth of the main beam for the depth of the hold, and work as for a single decked vessel.

EXAMPLE.

The tonnage of a double decked vessel is required, whose length is 80 feet, and breadth 26 feet?

As 95 : 26×13=half the breadth :: 80 : $284\frac{60}{95}$tons *answer.*

To find the Government Tonnage.

" If the vessel be double decked, take the length thereof from the fore part of the main stem, to the after part of the stern post, above the upper deck; the breadth thereof at the broadest part above the main wales, half of which breadth shall be accounted the depth of such vessel, and then deduct from the length three-fifths of the breadth, multiply the remainder by the breadth, and the product by the depth, and divide this last product by 95, the quotient whereof shall be deemed the true contents or tonnage of such ship or vessel; and if such ship or vessel be single decked, take the length and breadth, as above directed, deduct from the said length three-fifths of the breadth, and take the depth from the under side of the deck plank to the ceiling in the hold, then multiply and divide as aforesaid, and the quotient shall be deemed the tonnage."

PROMISCUOUS QUESTIONS.

1 A WAS born when B was 21 years of age; how old will A be when B is 47; and what will be the age of B when A is 60? *answer* A 26, B 81

2 What difference is there between twice five and twenty, and twice twenty five? *answer* 20

3 Two persons depart from the same place at the same time, the one travels 30, the other 35 miles a day; how far are they distant after seven days, if they travel both the same road, and how far, if they travel in contrary directions? *answer* 35 and 455 miles.

4 To how much amounts the order, for which a factor, at the rate of 2½ per cent. per annum, receives 22*l* 10*s*.? *answer* 900*l*.

5 A, B, C and D, are sharers in the value of a parcel of merchandize: A, B and C, have 350*l*. B, C and D, 345*l*. C, D and A, 400*l*. and D, A and B, 378*l*. query the whole sum, and each man's particular part? *answer* sum 491*l*. A 146*l*. B 91*l* C 113*l*. D 141*l*.

6 A stationer sold quills at 10*s* 6*d*. a thousand, by which he cleared $\frac{1}{3}$ of the money; but growing scarce, raised them to 12*s*. a thousand: what did he clear per cent. by the latter price? *answer* 71*l*. 8*s*. 6$\frac{6}{7}$*d*.

7 A person possessed of $\frac{3}{8}$ of a ship, sold $\frac{2}{3}$ of his share for 1260*l*. what was the value of the whole at the same rate? *answer* 5040*l*.

8 Bought a quantity of goods for 250*l*. and three months after sold it for 275*l*. how much per cent. per annum was gained by them? *answer* 40*l*.

9 A guardian paid his ward 3500*l*. for 2500*l*. which he had in his hands 8 years: what rate of interest did he allow him? *answer* 5 per cent.

10 Bought a quantity of goods for 150*l*. ready money, and sold it again for 200*l* payable at the end of 9 months; what was the gain in ready money, supposing rebate to be made at 5 per cent? *answer* 42*l* 15*s*. 5$\frac{5}{83}$*d*.

11 A person being asked the hour of the day, said, the time past noon is equal to $\frac{4}{5}$ths of the time till midnight: what was the time? *answer* 20 *min*. past 5

12 A person looking on his watch, was asked what was

the time of day, who answered, it is between 4 and 5; but a more particular answer being required, he said that the hour and minute hands were then exactly together: what was the time? *answer* 21 $\frac{9}{11}$ *min.* past 4.

13 With 12 gallons of canary at 6*s* 4*d.* a gallon, I mixed 18 gallons of white wine at 4*s* 10*d.* a gallon, aud 12 gallons of cyder at 3*s* 1*d.* a gallon. At what rate must I sell a quart of this composition so as to clear 10 per cent?
answer 1*s* 3$\frac{5}{7}$*d.*

14 What sum of money will produce as much interest in 3$\frac{1}{4}$ years, as 210*l* 3*s.* would in 5 years and 5 months?
answer 350*l* 5*s.*

15 If 100*l.* in 5 years be allowed to gain 20*l* 10*s.* in what time will any sum of money double itself at the same rate of interest? *answer* 24$\frac{16}{41}$ years.

16 What difference is there between the interest of 350*l.* at 4 per cent. for 8 years, and the discount of the same sum, at the same rate, and for the same time? *answer* 27*l* 3$\frac{1}{33}$*s.*

17 If by selling goods at 50*s.* per *C.wt.* I gain 20 per cent. what do I gain or lose per cent. by selling at 45*s.* per *C.wt.?* *answer* 8*l.* gain.

18 Sold goods for 63*l.* and by so doing lost 17 per cent. whereas I ought, in dealing to have cleared 20 per cent. then how much under their just value were they sold?
answer 28*l* 1*s* 8$\frac{20}{83}$*d.*

19 What is the sum of the third and half third of four pence? *answer* 2*d.*

20 What difference is there between 6 dozen dozen and half a dozen dozen? *answer* 792

21 When $\frac{1}{2}$ of the members of an assembly + 15 were met, there were $\frac{1}{3}$ + 10 absent; how many did that branch of the legislature consist of? *answer* 150

22 A person willing to distribute some money among a number of beggars, wanted 8*d.* to give them 3*d.* apiece, he therefore gave each 2*d.* and had 3*d.* left, how many were there of them? *answer* 11

23 How may 4 nines be placed so as to denote exactly 100? *answer* 99$\frac{9}{9}$

24 In what time will any sum of money double itself at 6 per cent. simple interest? *answer* in 16 years 8 mon.

25 A gentleman coming into a school, where the boys sat remarkably quiet, gave all the money he had in his pocket,

et, which was 8*s* 11*d.*½ to be distributed among them so that each boy had 2*d.*¾; how many were there? *answer* 39.

26 If the earth be 360 degrees round, each 69½ miles, how long would a man be in travelling the circumference, at 20 miles a day; admitting there were no obstacles, and reckoning 365¼ days in the year? *answer* 3 years, 155½da.

27 Bought goods to the amount of 74*l* 18*s*. and allowed discount at 5 per cent. what come they to? *answer* 71*l* 6*s* 8*d.*

28 What is the mean time for paying 100*l.* at 3¼ months, 150*l.* at 4½ months, and 204*l.* at 5¼ months? *answer* 4 months 23 days $\frac{268}{454}$.

29 What must be paid for $\frac{3}{16}$ of a ship that is valued at 1400*l.* *answer* 262*l* 10*s*.

30 Take the aliquot parts ⅓, ¼, ⅕, ⅙, successively one from the other out of 6*s* 9*d.*½ and give their sum? *answer* 2*s* 11*d.*½ $\frac{31}{180}$.

31 How many yards of stuff, that is ⅞*yd.* wide, will line 7⅗ ell English, that is an ell Flemish wide? *answer* 8*yds.* 0*qr.* 2*na.*⅔

32 E can mow an acre of grass in 7⅓ of an hour, and F in 8⅘ of an hour; in what time would they mow an acre, both of them working together? *answer* 4 hours.

33 In an orchard of fruit trees, ½ of them bear apples, ¼ pears, ⅙ plumbs, 60 of them peaches and 40 cherries; how many trees does the orchard contain? *answer* 1200.

34 A person who was possessed of $\frac{2}{7}$ of a vessel, sold ⅝ of his interest for 375*l.* what was the ship worth at that rate? *answer* 1500*l.*

35 If $\frac{5}{7}$ of ⅜ of $\frac{4}{7}$ of a ship be worth $\frac{2}{9}$ of ⅞ of $\frac{12}{13}$ of the cargo, valued at 1000*l.* what did both ship and cargo cost? *answer* 1837*l* 12*s* 1*d.*$\frac{25}{39}$.

36 A younger brother received 1560*l.* which was just $\frac{7}{12}$ of his elder brother's fortune, and 5⅜ times the elder's money was ⅔ as much again as the father was worth, what was his estate valued at? *answer* 19165*l.* 14*s* 3*d.*$\frac{3}{7}$

37 A gentleman left his son a fortune; $\frac{5}{16}$ of which he spent in 3 months; ¾ of ⅚ of the remainder lasted him nine months longer, when he had only 537*l.* left; what did his father bequeath him? *answer* 2082*l* 18*s* 2*d.* [illegible]

38 If A can do a piece of work alone in 7 days, and B in 12; set them both about it together; in what time will they finish it?

$$\text{As}\left\{\begin{array}{cccc} \textit{D.} & \textit{W.} & \textit{D.} & \textit{W.}\\ 7 : & 1 :: & 1 : & \frac{1}{7}\\ 12 : & 1 :: & 1 : & \frac{1}{12}\end{array}\right\}\ \text{Then, } \overset{\textit{W.}}{\frac{1}{7}}+\overset{\textit{W.}}{\frac{1}{12}}=\overset{\textit{W.}}{\frac{19}{84}}$$

$$\text{As } \overset{\textit{W.}}{\frac{19}{84}} : \overset{\textit{D.}}{\frac{1}{1}} :: \overset{\textit{W.}}{\frac{1}{1}} : \overset{\textit{D.}}{4\frac{8}{19}}\ \textit{answer.}$$

39 A and B, together, can build a boat in 20 days; with the assistance of C they can do it in 12; in what time would C do it by himself? *answer* 30 days.

$$\text{As}\left\{\begin{array}{cccc} \textit{D.} & \textit{W.} & \textit{D.} & \textit{W.}\\ 20 : & 1 :: & 1 : & \frac{1}{20}\\ 12 : & 1 :: & 1 : & \frac{1}{12}\end{array}\right\}\ \text{Then, } \overset{\textit{W.}}{\frac{1}{12}}-\overset{\textit{W.}}{\frac{1}{20}}=\overset{\textit{W.}}{\frac{1}{30}},\ \text{and}$$

$$\text{As } \overset{\textit{W.}}{\frac{1}{30}} : \overset{\textit{D.}}{1} :: \overset{\textit{W.}}{1} : \overset{\textit{D.}}{30}\ \textit{answer.}$$

40 A can do a piece of work alone in 13 days, and A and B together in 8 days; in what time can B do it alone?

$$\text{As}\left\{\begin{array}{cccc} \textit{D.} & \textit{W.} & \textit{D.} & \textit{W.}\\ 13 : & 1 :: & 1 : & \frac{1}{13}\\ 8 : & 1 :: & 1 : & \frac{1}{8}\end{array}\right\}\ \text{Then, } \overset{\textit{W.}}{\frac{1}{8}}-\overset{\textit{W.}}{\frac{1}{13}}=\overset{\textit{W.}}{\frac{1}{104}},\ \text{and}$$

$$\text{As } \overset{\textit{W.}}{5} : \overset{\textit{D.}}{1} :: \overset{\textit{W.}}{104} : \overset{\textit{D.}}{20\frac{4}{5}},\ \textit{answer.}$$

41 A, B and C, can complete a piece of work in 15 days; A can do it alone in 30 days, and B in 40; in what time can C do it by himself?

$$\text{As}\left\{\begin{array}{cccc} \textit{D.} & \textit{W.} & \textit{D.} & \textit{W.}\\ 15 : & 1 :: & 1 : & \frac{1}{15}\\ \hline 30 : & 1 :: & 1 : & \frac{1}{30}\\ 40 : & 1 :: & 1 : & \frac{1}{40}\end{array}\right\}\ \text{Then, } \overset{\textit{W.}}{\frac{1}{15}}-\overset{\textit{W.}}{\frac{1}{30}}+\overset{\textit{W.}}{\frac{1}{40}}=\overset{\textit{W.}}{\frac{1}{120}},\ \text{and}$$

$$\text{As } \overset{\textit{W.}}{1} : \overset{\textit{D.}}{1} :: \overset{\textit{W.}}{120} : \overset{\textit{D.}}{120},\ \textit{answer.}$$

42 A cistern for water has two cocks to supply it, by the first it may be filled in 45 minutes, and by the second in 55 minutes; it has likewise a discharging cock, by which it may, when full, be emptied in 30 minutes: now if these three cocks be all left open when the water comes in, in what time will the cistern be filled?

M. Cist. M. Cist. *Cist. H. Cist. H. min. sec.*

45 : 1 :: 60 : 1,3333 As ,4242 : 1 :: 1 : 2 21 $26\frac{1}{2}$ *answer.*

55 : 1 :: 60 : 1,0909

2,4242

30 : 1 :: 60 : 2

Gains in an hr. ,4242 of a cistern.

43 The hour and minute hands of a watch are exactly together at 12 o'clock; when are they next together?

[illegible]elocities of the two hands of a watch, or clock, are to each other, as 12 to 1; therefore the difference of velocities is 12—1=11.

$$\text{As } 11 : 1 :: \left\{\begin{array}{l} 12\times 1 : 1 \quad 5 \quad 27\frac{3}{11} \\ 12\times 2 : 2 \quad 10 \quad 54\frac{6}{11} \\ 12\times 3 : 3 \quad 16 \quad 21\frac{9}{11} \end{array}\right\} \text{answer, \&c.}$$

(h. m. s.)

44 A fellow said when he counted his nuts, two by two, three by three, four by four, five by five, and six by six, there was still an odd one; but when he told them seven by seven, they came out even; how many had he?

2×3×4×5×6=720, & 720+1÷7=103 even, *ans.* 721

$\frac{721}{2,\ 3,\ 4,\ 5,\ \text{and } 6}$ respectively, will leave an odd one.

45 There is an island, 50 miles in circumference, and 3 men start together to travel the same way about it. A goes 7 miles per day, B 8, and C 9; when will they all come together again, and how far will each have travelled?

50 × 7+50 × 8+50 × 9÷7 +8 + 9=50 days.—A 350 miles, B 400, and C 450, *answer.*

46 Three persons purchased a vessel in company, towards the payment whereof A advanced $\frac{2}{5}$, B $\frac{3}{7}$ and C 256*l.* what did A and B pay each, and what part of the vessel had C?

answer A 597*l* 6*s* 8*d*. B 640*l*. C's part $\frac{6}{35}$

47 A line 35 yards long will exactly reach from the top of a fort, standing on the brink of a river, to the opposite bank, known to be 27 yards broad; what is the height of the wall?

answer 22 yards, 9½+inches nearly.

Of the fall of Bodies.

Heavy bodies near the surface of the earth fall one foot the first quarter of a second; three feet the second quarter; five feet the third, and seven feet in the fourth quarter; that is, sixteen feet in the first second.

The space fallen through (in feet) is always equal to the square of the time in fourths of a second.

The time given to find the space fallen through.

Rule 1. The square root of the feet in the space fallen through, will be equal to four times the number of seconds the body has been falling: Therefore,

2. Multiply the time by 4; and the square of the product will be the space fallen through in the given time.

48 A bullet is dropped from the top of a building, and found to reach the ground in 1¾ second; required its height?

$1{,}75 \times 4 = 7$, and $7 \times 7 = 49$ feet, *answer.*

49 What is the difference between the depth of two wells, into each of which should a stone be dropped in the same instant, one would reach the bottom in 5 seconds, and the other in 3?

$5 \times 4 = 20$, and $20 \times 20 = 400$ feet.
$3 \times 4 = 12$, and $12 \times 12 = 144$ feet.

answer 256 feet.

50 Ascending bodies are retarded in the same ratio that descending bodies are accelerated; therefore, if a ball, discharged from a gun, returned to the earth in 12 seconds; how high did it ascend? *answer* 576 feet.

The space through which a body has fallen given, to find the time it has been falling.

Rule 1. Four times the number of seconds in which the body has been falling, will be equal to the square root of the space, in feet, through which it has fallen: Therefore,

2. Divide the square root of the space fallen through by 4, and the quotient will be the time in which it was falling.

51 In what time will a musket ball, dropped from the top of a steeple 484 feet high, come to the ground?

answer 5½ seconds.

52 If a cubical piece of timber be 47 inches long, 47 inches broad, and 47 inches deep, how many cubical inches doth it contain? *answer* 103823

53 There is a cellar dug that is 12 feet every way, in length, breadth and depth, how many solid feet of earth were taken out of it? *answer* 1728

54 What is the price of a marble slab, whose length is 5 feet 7 inches, and breadth 1 foot 10 inches, at 1 dollar per foot? *answer* 10 dols. 23 cents.

55 If a house measures within the walls 52 feet 8 inches in length, and 30 feet 6 inches in breadth, and the roof be of a true pitch or the rafters ¾ of the breadth of the building, what will it come to roofing at 1,75 cts. per square?

answer 42,16

56 What will 931 yards of shalloon come to at 55cts. 4ms. per yard? *answer* 515dols 77cts. 4ms.

57 How many bushels of wheat at 1 dol. 12cts. per bushel can I have for 81 dols. 76 cts.? *answer* 73 bushels.

58 What will 94*C.wt.* of iron come to at 4 dols. 97 cts. 2 ms. per *C.wt.* *answer* 467dols 36cts. 8ms.

59 What will 27*C.wt.* of iron come to at 4 dol. 56 cents per *C.wt*? *answer* 123 dols. 12 cts.

60 How much will 281 yards of tape come to at 9 mills per yard? *answer* 2 dols. 52 cts. 9ms.

61 What will 371 yards of broadcloth come to at 5 dols. 79 cts per yard? *answer* 2184 dols. 9 cts.

62 How much will 29½ yards of mode come to at 75 cts. per yard? *answer* 22 dols. 12 cts. 5 mills.

63 What will 32,625 feet of boards come to at 8 dols. 25cts per M.? *answer* 194 dols. 90 cts. 6 ms.

64 When a man's yearly income is 949 dols. how much is it per day? *answer* 2 dols. 60 cts.

65 At 4½ per cent. what is the commission on 1525 dols.? *answer* 68 dols. 62 cts. 5 ms.

66 What is the interest of 456 dollars for 1 year, at 6 per cent.? *answer* 27 dols. 36 cts.

67 At 5 dols. 50 cts. per M. what will 21,186 feet boards come to? *answer* 116 dols. 52 cts. 3 ms.

68 When boards are sold at 18 dols. per M. what is it per foot? *answer* 1 cent 8 mills.

69 A charter-party for a vessel of 186 tons commenced on 28th of May, and ended on the 10th of October following: what does the hire amount to for that time, at 2 dols. per ton per month of 30 days? *answer* 1686 dols. 40 cts.

70 What is the commission on 2176 dols. 50cts. at 2½ per cent.? *answer* 54 dols. 41 cts. 2ms.

71 The sales of certain goods amount to 1873 dols. 40cts. what sum is to be received for them, allowing 2½ per cent. for commission, and ¼ per cent. for prompt payment of the neat proceeds? *answer* 1821 dols. 99 cts. 9 ms.

72 What is the premium on 1650 dollars at 12 per cent.? *answer* 198 dols.

73 What is the premium of insuring 1250 dols. at 7½ per cent.? *answer* 93 dols. 75 cts.

74 What is the premium of insuring 4500 dollars, at 25 per cent? *answer* 1125 dols.

75 What is the premium of insuring 1650 dols. at 15½ per cent? *answer* 255 dols. 75 cts.

A COURSE
OF
BOOK-KEEPING,
ACCORDING TO THE METHOD OF SINGLE ENTRY.

WITH a description of the Books, and Directions for using them: very useful either for young Book-keepers entering into business, or for masters to teach in their Schools.

ALTERED FROM C. HUTTON.

IT is very necessary that almost every person who is intended for business should learn a course of Book-keeping of this kind, because it is used in almost every shop. The Italian method alone is not sufficient; for it is a constant complaint among the merchants, and others, who use this method, that their boys, having learnt only the Italian method, when they first come to business, are almost as ignorant in the management of their books, as if they had never learnt any method at all. There are some boys who have not time to learn, or perhaps a capacity to understand a complete course of the Italian method; there are also, many intended for such kinds of business, as that the Italian method would be thrown away upon them: To all such then, this method will be very useful. And even supposing a boy is intended for a business which requires the Italian method alone, I would, notwithstanding, have him taught this method first, if it were only to facilitate his acquisition of the other. This method is so easy, that it may also be taught in a few weeks time to young women as well as young men.

The forms of the books may be sufficiently known by inspection.—In the day-book, every person's name is set down *Dr. To* the things he receives from you on trust, and *Cr. By* those which you receive from him. In the margin of the day-book are written the pages where the accounts stand in the ledger: Instead of these marginal figures, some make only a stroke or dash with the pen, to shew that the account has been posted, that is, entered in the ledger; but it is better to use the figures, for they shew, not only that the account has been posted, but likewise where to find it in the ledger, without looking in the alphabet. In the day-book I have set down only the total amount of all the articles of each day, collected into one sum; having purposely omitted the amount or value of each single line or article, every one of which the learner is to compute by way of exercise, and as it were in real trade, and enter in their proper columns in the day-book as he copies it out. Then the printed sum totals will shew him if he has computed the particulars rightly.

I have entered in the day-book what is received as well as what is delivered, which is absolutely necessary in teaching; for the learner ought to make out all his own ledger from his day-book.

There are several other books kept by most merchants, as the cash book, the book of house expences, the invoice-book, &c.

Directions for the Learner.

Having ruled your books in the proper form, copy into the day-book one month's accounts; then calculate them upon your slate or waste paper, to find if they be rightly cast up, and to exercise you in calculations. Next rule your slate or waste paper, in the form of the ledger, and upon it post the accounts that were copied in the day-book, with their dates prefixed; observing to set on the Dr. side of each person's account, those accounts to which he is Dr. in the day-book, and on the Cr. side, those by which he is Cr. And if any account consist but of one article, you are to express it particularly, with its money, in the columns; but if of several, write *To* or *By* sundries, placing the sum of the amounts of all the articles in the columns. After the accounts are, by correcting, if necessary, placed according to the teacher's mind, transcribe them into your ledger, leaving a proper space under each person's name to receive more accounts. Then, under the proper letters in the alphabet, enter those names with the pages where they stand in the ledger; and lastly, write the ledger pages to the several accounts in the day-book. Do the same with the next month's accounts; and so on, till the whole be finished.—But observe that you must not enter any person's name down again which has been entered before, till the space first assigned to it shall be filled with articles; and then the account must be transfered to a new place, as you may observe is done with Jane Strawberry's account.

When the first ledger, titled A, is filled with acco
u must, as is done with the following ledgers, tran
e unbalanced accounts to the second ledger, titled B,
on, according to the order of the letters of the alphat
d at the end of the old ledger draw out a balance acco
acing your debts on one side, and your credits on the ot

THE DAY BOOK.

		D.c	D.
	1st month 1, 1810.		
1	*James Elford, of Lancaster,* *Dr.*		
	To 15 yards of fine broad cloth - at	4,25	
	24 superfine ditto -	6,75	
			22
1	*George Robson, of York,* *Dr.*		
	To 12 gallons Madeira Wine - at	2,75	
	17 red Port - -	1,25	
	9 Claret - -	1,65	
			69
	4		
1	*Mary Masterman,* *Dr.*		
	To 1½ pounds Green tea - - at	2.00	
	2½ Souchong - -	1,40	
	28 lb. brown Sugar - -	,12	
	1 Lump ditto 14½ lb. -	,20	
			12
	9		
2	*Jane Strawberry,* *Dr.*		
	To 9½ yards Sattin - - at	2,36	
	13 Mantua - - -	1,45	
			41

			D.	c.
	1st month 20, 1810.			
2	*Jonas More, Dr.*			
	To 1 Ream thick Post, -		9	50
	1st month 27,			
2	*James Wilson, Schoolmaster, Dr.*			
	To 6 American Tutor's Assistant	at ,56		
	3 dozen Copy-books - -	1,50		
	2 quires Foolscap writing paper	,25		
	1 Quire Thick post - -			70
			9	06
	2d month 5th,			
3	*Aaron Ableman, Dr.*			
	To 1 Ledger - - - -		4	
	5 C. Quills, - -	at 1,25		
	3 Reams writing paper, -	- 4,		
	6 Quires letter paper, -	,25		
	20 Reams brown paper, - -	1,06		
			44	95
	12			
3	*William Winton, Dr.*			
	To 20 oz. Nutmegs, - -	at ,20		
	5½ lb. Coffee, - -	,30		
	3 lb. Chocolate, - -	,33		
	4 lb. Almonds, - -	,25		
	8½ lb. Raisins, - -	,22		
			9	51
	20			
3	*William Watson, Dr.*			
	To 3 gal. Rum, - - -	1,20		
	4 Brandy, - -	1,25		
	3 Gin, - - -	1,20		
			12	20

					D.	c.
	2d month 27th, 1810.					
	Jonas More, Cr.					
	By cash received of him in full, -				9	50
	3d month 1st.					
	Jeffery Slingstone, Dr.	oz.	dwt.			
	To A silver bowl, wt,	23	4	- 2,00		
	a Can -	10	0	- 2,10		
	a Tea pot, -	30	5	- 2,20		
	6 Plates -	73	10	- 2,00		
	18 Spoons, -	41	00	- 1,90		
					368	85
	10					
1	*George Robson, of York, Dr.*					
	To 27 gal. Sherry wine, -			at 2,00		
	22 Madeira, - -			2,75		
	34 Lisbon, - -			1,25		
					157	00
	4th month 27th.					
4	*Thomas Lawson, Dr.*					
	To 7½ yards Scarlet cloth -			at 7,50		
	4 Superfine blue do. -			7,00		
	¼ Velvet - -			3,00		
					85	00
	12					
2	*Jane Strawberry, Dr.*					
	To 11 yds. Lustring - -			at 1,48		
	14 Sattin - - -			3,25		
					61	78
	24					
1	*Mary Masterman, Cr.*					
	By cash received of her in full, -				12	41

			D.	c.
	4th month 25th, 1810.			
4	*David Johnson,* *Dr.*			
	To 5 gal. Spermaceti oil, -	at 1,06		
	3½ Train oil, - -	,60		
	3 quarts Sweet oil, - -	,86		
			9	98
	5th month 3d.			
1	*James Elford,* *Dr.*			
	To 27 yards Forrest Cloth -	at 1,10		
	16 Plains, - -	,83		
	12 Serge, - -	,48		
	32 Shalloon, - -	,34		
			59	62
	10			
4	*Thomas Lawson,* *Dr.*			
	To 7 yds. Superfine black cloth	at 6,75		
	12 Shalloon - -	,36		
	1 dozen and 9 coat buttons,	,36		
	2 8 waistcoat do. -	,18		
			52	68
	10			
5	*Nicholas Norton,* *Dr.*			
	To 9 pair Worsted stockings,	at 1,25		
	6 do. Silk do. - -	2,50		
	17 do. Thread do. -	1,75		
	23 do. Cotton do. -	1,50		
	14 do. Yarn do. -	1,12		
	18 do. Women's gloves, -	,75		
	19 yds. Flannel, - -	,39		
			127	09
	20			
4	*Thomas Lawson,* *Cr.*			
	By a bill on James Dixon, for -		50	

			D.	c.
	5th month 20th, 1810.			
4	*David Johnson, Dr.*			
	To 13 Goshen cheeses, wt 5C. 3qr. 12lb.	,14		
	25 Rhode Island do. 6 0 18	,12		
	47 Jersey, do. 6 1 5	,9		
			238	09
	26			
5	*Mary Shields, Dr.*			
	To 8lb. Rice, - -	at ,5		
	3½ Currants, - -	,20		
	2 quarts of Vinegar, -	,6		
			1	22
	6th month 3d.			
5	*John Dixon, Dr.*			
	To 7 Bushels wheat, -	at 1,25		
	9 rye, - -	,75		
	17 Oats, -	,30		
			20	60
	12			
4	*Jeffery Slingstone, Cr.*			
	By cash received by his son, -		20	00
	17			
1	*Mary Masterman, Dr.*			
	To 14lb. hard Soap, -	at ,14		
	5 soft, - -	,4		
	3½ Starch, - -	,10		
	3½ oz. Indigo, - -	,20		
	10lb. Raisins, - -	,21		
	3 dozen Candles, -	2,00		
			11	31
	21			
1	*Mary Masterman, Cr.*			
	By 40 yards Russia sheeting,	at ,75		

	6th month 28th, 1810.		D.	c.
4	*David Jones,* Dr.			
	To 17lb. Cream cheese	at ,12		
	53 Bacon,	,10		
	15½ Butter,	,25		
			11	21
	7th month 3d.			
6	*Fanny Dawson,* Dr.			
	To 14 yds. Blue ribbon	at ,9		
	21 White do.	,7		
	12 Lace,	,43		
	9 pair Kid gloves,	,36		
			11	33
	7			
2	*James Wilson,* Cr.			
	By cash received in full,		9	06
	10			
6	*Roger Retail,* Dr.			
	To 24lb. Royal Green Tea,	at 2,50		
	21 Imperial,	3,00		
	35 best Bohea	1,50		
	17 Coffee,	,30		
	25 double refined Sugar,	,20		
	9 Loaves Sugar, wt. 137lb.	,10		
			199	30
	17			
6	*Charles Anderson,* Dr.			
	To 6 Mahogany chairs,	at 2,50		
	2 Elbow do.	3,00		
	2 pier Glasses,	5,00		
			31	00

			D.	c.
	7th month 24th, 1810.			
6	*Charles Anderson, Dr.*			
	To 25 yds. Curtain stuff, -	at ,30		
	12 Ticking, - -	,17		
	3 lb. Feathers, - -	,75		
	2 pier Tables,	6,50		
			24	79
	28			
5	*James Dixon, Dr.*			
	12 bushels Peas, - -	at ,36		
	9 Beans, -	,45		
	17 Malt, - -	,50		
	25lb. Hops, -	,18		
			21	37
	8th month 1st.			
3	*William Winton, Dr.*			
	To 10 groce Bottles -	at 3,00		
	9 Small do. - -	1,50		
	2 dozen Wine glasses,	,48		
	3 Decanters, -	,20		
			45	06
	7			
3	*Aaron Ableman, Cr.*			
	By a note on David James, -		26	66
	Cash in full,		18	29
			44	95
	12			
4	*David Johnson, Cr.*			
	By Cash in part, - -		133	00
	16			
	Charles Anderson, Cr.			
	By 5 pockets of Hops, - -	6,40		

			D.	c.
	8th month 18th, 1810.			
6	*Charles Anderson,* Dr.			
	To 1 Mahogany bedstead, -		6	66
	2 Stools, - -	,70		
	Poker, tongs, and fender,	1,27		
	Two other sets of Irons,	2,00		
			10	63
	21			
7	*Conrad Compound,* Dr.			
	To 21 lb. Cochineal, -	at 3,50		
	6¼ Opium - -	,84		
	53 Scammony, - -	1,18		
			141	29
	26			
7	*John Baker,* Dr.			
	To 5 Gross brass buttons, -	at 2,40		
	2 white, - - -	2,00		
	7 dozen pair of Buckles, -	,30		
	12 Trunk locks, - -	,10		
	6 Chamber do. - - -	,33		
			21	28
	9th month 3d.			
7	*Mary March,* Dr.			
	To 8 Sarcenet hoods, - -	at ,57		
	4			
2	*James Willson,* Dr.			
	To 6 Hutton's Arithmetic -	at ,30		
	1 thousand Pinions, -	,33		
	3 dozen Copy books, -	,33		
	3 quires of thin Post, -	,12		
	Lowth's English grammar, -	,40		
			3	88

	9th month 6th, 1810.		D.	c.
2	*Jane Strawbery*, *Dr.*			
	To 12½ yds. Sattin,	at 1,40		
	9			
3	*Nicholas Norton*, *Cr.*			
	By a Bank note, for		53	33
	12			
2	*Jane Strawberry*, *Dr.*			
	To 11 yds. Velvet,	at 2,40		
	16			
2	*James Willson*, *Dr.*			
	To the Universal Penman,		3	33
	16			
7	*Mary March*, *Dr.*			
	To 17 Indian fans,	at ,50		
	18			
1	*Mary Masterman*, *Cr.*			
	By cash in full,		18	69
	22			
2	*Jane Strawberry*, *Cr.*			
	By cash received of the Steward,		53	33
	27			
6	*Charles Anderson*, *Cr.*			
	By cash in full,		34	42
	27			
7	*Mary March*, *Dr.*			
	To 21 yds. Ribbon,	at ,25		
	11½ Lace,	1,40		
			21	35
	10th month 2d.			
	Samuel Edwards, *Dr.*			
3	To 14 lb. Flax,	at ,12		
	4			
3	*Richard Barber*, *Cr.*			
	By 30 reams foolscap paper,	at 3,30		
	6th.			
	Jane Strawberry, *Dr.*			
	To 27½ yds. Holland,	at ,66		

	10th month 6th, 1810.		D.	c.
4	*David Johnson,* Cr.			
	By cash in full,		126	28
	10			
9	*Mathew Milton,* Dr.			
	To 40 yds. Dowlas	at ,25		
	34 Diaper,	,20		
	31 Holland,	,75		
			40	05
	13			
	Jane Strawberry, Dr.			
8	To 40 yds. Irish Linen,	at ,90		
			36	
	14			
9	*Henry Foster,* Dr.			
	To 2½ Cwt. of Iron,	at 2,50		
	21			
9	*Mary Grey,* Dr.			
	To 3 ps. Irish Linen 87 yds.	at ,30		
	23			
7	*John Baker,* Cr.			
	By Cash in full,		21	28
7	*Mary March,* Dr.			
	To 9 pair Kid gloves,	at ,26		
	60 Lamb do.	,30		
	12 pieces Bobbin,	,7		
			21	18
	25			
8	*Jane Strawberry,* Cr.			
4	By cash in full,		147	07
	27			
1	*George Robson,* Cr.			
	By cash in full,		226	10

			D.	c.
	10th month 30th, 1810.			
8	*Samuel Edwards,* *Dr.*			
	To 12lb. Flax, - -	at ,12		
	14lb. do. - -	,10		
			2	84
	11th month 4th.			
9	*Mathew Milton,* *Cr.*			
	By 30 gallons Brandy,	at 1,25		
	Cash in full - -	2,55		
			40	05
	7			
10	*Samuel Simpson,* *Dr.*			
	To 3 loaves Sugar wt. 32½lb.	at ,10		
	13			
1	*James Elford,* *Cr.*			
	By a bill for - -		133	
	15			
5	*James Dixon,* *Dr.*			
	By 3 pieces of Holland I12½ yards, at,	I,00		
5	*James Dixon,* *Dr.*			
	To cash in full, - -		70	53
	20			
10	*Samuel Simpson,* *Dr.*			
	To I5lb. Currants, -	at ,I5		
	22			
10	*Thomas Grey,* *Dr.*			
	To 2 dozen knives and forks,	at 2,00		
	a set of China, - -		6	[illegible]
	18 China plates, -	,30		
	3 Dishes, -	,60		
	1 Mahogany Tea board, -		1	49
			19	35

	11th month 26th, 1810.		D.	c.
10	*Thomas Grey*, Cr.			
	By 42 yds. of Holland -	at ,75		
	28			
4	*Jeffery Slingstone*, Cr.			
	By cash in full, - -		348	85
	29			
10	*Samuel Simpson*, Dr.			
	To 17lb. Malaga Raisins, -	at ,17		
	19 Raisins of the Sun,	,16		
	17 Rice, - -	,4		
	8 Pepper, - -	,29		
	13 oz. Cloves, - -	,22		
			11	79
	12 month 1st.			
2	*James Wilson*, Cr.			
	By cash in full, - -		7	21
	3			
8	*Aaron Ableman*, Dr.			
	To 1 pipe of Wine, - -		167	
	6			
8	*William Winton*, Cr.			
	By 30 gallons Brandy, -	at 1,00		
	Cash in full, - -		24	57
			54	57
	8			
10	*Thomas Hunter*, Dr.			
	To 3 bushels of Coal, -	at 1,25		
	10			
3	*William Watson*, Cr.			
	By cash in full, - -		12	20
	12			
11	*Peter Thomson*, Dr.			
	To 236 gallons of Oil,	at ,45		

		D.
	12th month 13th, 1810.	
9	*Henry Foster,* Cr.	
	By Cash in full, - -	6
	15	
4	*Thomas Lawson,* Cr.	
	By 3C. 2qr. 14lb. of Tobacco, at 10,00	
	18	
5	*Mary Shields,* Dr.	
	To 1 lump of Sugar, wt. 22¼ lb. at ,11	
	20	
10	*Samuel Simpson,* Cr.	
	By Cash in full, - - -	17
	22	
6	*Fanny Dawson,* Cr.	
	By Cash in full, - -	11
	23	
11	*Edward Young,* Dr.	
	To 3C. 1qr. 0lb. Cheese - 4,10	
	24	
6	*Roger Retail,* Cr.	
	By a bill on Thomas Williams, for	99
5	*Mary Shields,* Cr.	
	By Cash in full, - -	3
	29	
7	*Mary March,* Cr.	
	By Cash in full, - - -	55

Ledger A.

THE ALPHABET.

A		B		C	
Aaron Ableman,	3	*John Baker,*	7	*Conrad Compound,*	7
Charles Anderson,	6	*Richard Barber,*	8		
		Balance,	11		
D		E		F	
James Dixon,	5	*James Elford,*	1	*Henry Foster,*	9
Fanny Dawson,	6	*Samuel Edwards,*	8		
G		H		I	
Mary Grey,	9	*Thomas Hunter,*	10	*David Johnson,*	4
Thomas Grey,	10				
K		L		M	
		Thomas Lawson,	4	*Mary Masterman,*	1
				Jonas More,	2
				Mary March,	7
				Mathew Milton,	9
N		O		P	
Nicholas Norton,	5				
Q		R		S	
		George Robson,	1	*J. Strawberry,*	2, 8
		Roger Retail,	6	*Jeffery Slingstone,*	4
				Mary Shields,	5
				Samuel Simpson,	10
T		V		W	
Peter Thomson,	11			*James Wilson,*	2
				William Winton,	3
				William Watson,	3
X		Y		Z	
		Edward Young,	11		

(1)

Dr.	*James Elford,*	D.	c.		Contra Cr.	D.	c.
1810				1810			
[illegible] 1	To Sundries -	225	75	11 mo. 13	By a Bill for -	133	
[illegible] 3	do. -	59	52		By acct. Folio 1 Ledger B	152	27
		285	27			285	27

1810.	Dr. *George*			1810	*Robson,* Cr.		
1st mo. 1	To Sundries -	69	10	10 mo. 27	By cash in full -	216	10
3d. 10	ditto. -	157					
		226	10				

1810	Dr. *Mary*			1810	*Masterman,* Cr.		
1st mo. 4	To Sundries -	12	41	4 mo. 24	By cash in full	12	41
6 17	ditto -	11	31	6 21	40 yds. Russia sheeting	30	
9 18	To cash in full	18	69				
		42	41			42	41

		Dr.	*Jane Strawberry,*				*Contra*	*Cr.*	
1810			D.	c.	1810			D.	c.
1st mo.	9	To Sundries -	41	27	9 mo.	22	By cash received of the Steward -	53	33
4th	12	do. -	61	78			By account at folio 8	93	62
9th	6	To 12¼ yds. Sattin	17	50					
	12	11 yds. velvet	26	40					
			146	95				146	95
1810		*Dr.*	*Jonas*		1810		*More,* *Cr.*		
1st mo.	20	To Sundries -	9	50	2 mo.	27	By cash received of him in full -	9	50
1810		*Dr.*	*James*		1810		*Wilson,* *Cr.*		
1st mo.	27	To Sundries -	9	6	7 mo.	7	By cash received in full	9	6
9	4	do. -	3	88	12	1	By cash in full -	7	21
	16	Universal Penman	3	33					
			7	21					

	Dr.	*Aaron Ablamin,*				*Contra*	Cr.	
1810			D.	c.	1810		D.	c.
2d. mo. 5	To Sundries		44	95	8th mo. 7	By a note upon D. James	26	66
						Cash in full -	18	29
12 mo. 3	To 1 pipe of Wine		167					
							44	95
						By folio 1 Ledger B	167	
1810	Dr.	*William*			1810	*Winton,* Cr.		
2d. mo. 12	To Sundries -		9	51	12 mo. 6	By 30 gallons of Brandy	30	
8 mo. 1	do. -		45	6		Cash in full -	24	57
			54	57			54	57
1810	Dr.	*William*			1810	*Watson.* Cr.		
2d. mo. 20	To sundries -		12	20	12 mo. 10	By cash in full -	12	20

	Dr.	Thomas Lawson,			Contra Cr.		
1810		D.	c.	1810		D.	c.
4th mo. 7	To Sundries -	85		5th mo. 20	By a bill on James Dixon,	50	
5 10	do. -	52	68	12 15	Tobacco -	36	25
					By acct. folio 1 Ledger B	51	43
		137	68			137	68
1810	Dr. David			1810	Johnson, Cr.		
4th mo. 25	To Sundries -	9	98	8th mo. 12	By cash in part -	133	
5 20	do. -	238	9	11 6	do. in full	126	28
6 28	do. - -	11	21				
		259	28			259	28
1810	Dr. Jeffery			1810	Slingſtone, Cr.		
3d mo. 1	To Sundries -	368	85	6th mo. 12	By cash received by his son	20	
				11 28	By do. in full -	348	85
						368	85

(5) *Dr.* *Mary Shields,* *Contra* *Cr.*

			D.	c.				D.	c.
1810					1810				
5th mo.	26	To Sundries -	1	22	12 mo.	24	By cash in full	3	95
12	18	do. -	2	73					
			3	95					
1810		*Dr.* *James*			1810		*Dixon,* *Cr.*		
6th mo.	3	To Sundries -	20	60	11 mo.	15	By 3 pieces Holland	112	50
7	28	do. -	21	37					
11	15	Cash in full -	70	53					
			112	50					
1810		*Dr.* *Nicholas*			1810		*Norton,* *Cr.*		
5th mo.	10	To Sundries, -	127	09	9th mo.	9	By a bank note for	53	33
							By acct. folio 2 Ledger B	73	76
								127	09

Dr. *Fanny Dawson,* *Contra* *Cr.*

			D.	c.				D.	c.
1810					1810				
7th mo.	3	To Sundries -	11	13	12 mo	22	By cash in full	11	13
1810		*Dr.* *Roger*			1810		*Retail,* *Cr.*		
7th mo.	10	To Sundries -	199	30	12 mo.	24	By a bill -	99	30
							By acct. folio 2 Ledger B	100	
								199	30
1810		*Dr.* *Charles*			1810		*Anderson,* *Cr.*		
7th mo.	17	To Sundries -	31		8th mo.	16	By 5 pockets of hops	32	
	24	do. -	24	79	9	24	By cash in full	34	42
8	18	do. -	10	63					
			66	42				66	42

(7)

	Dr.	*Conrad Compound,*	D.	c.		*Contra*	*Cr.*	D.	c.
1810					1810				
8th mo. 21	To Sundries	-	121	29		By acct: folio 2 Ledger B		121	29
1810	*Dr.*	*John*			1810	*Baker,*	*Cr.*		
8th mo. 26	To Sundries	-	21	28	10 mo. 23	By cash in full	-	21	28
1810	*Dr.*	*Mary*			1810	*March,*	*Cr.*		
9th mo. 3	To Sundries	-	4	56	12 mo. 29	By cash in full,		55	59
16	do.	-	8	50					
27	do.	-	21	35					
10 23	do.	-	21	18					
			55	59					

Dr. *Samuel Edwards,* *Contra* *Cr.*

1810		D.	c.	1810	*Cr.*	D.	c.
10 mo. 2	To Sundries -	1	68		By acct. folio 3 Ledger B	4	52
10 30	do. -	2	84				
		4	52				

Dr. *Richard Barber,* *Cr.*

1810				1810			
	To acct. fol. 3 Ledger B	99	00	10 mo. 4	By 30 reams of paper	99	00

Dr. *Jane Strawberry,* *Cr:*

1810				1810			
	To account from folio 2	93	62	10 mo. 25	By cash in full -	147	77
10 mo. 6	To $27\frac{1}{2}$ yds. Holland ,66	18	15				
13	40 yds. Irish linen ,90	36					
		147	77				

(9)	*Dr.* *Mathew Milton,*				*Contra* *Cr.*		
1810 10 mo. 10	To Sundries -	40	05	1810 11 mo. 4	By Sundries in full	40	05
1810	*Dr.* *Henry*			1810	*Foster,* *Cr.*		
11 mo. 10	To Sundries -	6	25	12 mo. 13	By cash in full	6	25
1810	*Dr.* *Mary*			1810	*Grey,* *Cr.*		
10 mo. 21	To Sundries -	26	10	10 mo. 21	By 42 yds. Holland	31	50
11 22	do.	19	26		By acct. folio 3 Ledger B	13	86
		45	36			45	36

	Dr.	*Samuel Simpson,*			*Contra*	*Cr.*	
1810				1810			
11 mo. 7	To Sundries -	3	25	12 mo. 20	By cash in full	17	29
20	db. -	2	25				
29	do. -	11	79				
		17	29				
1810	*Dr.* *Thomas*			1810	*Grey,* *Cr.*		
11 mo. 23	To Sundries -	19	35		By 42 yds. Holland	31	50
	By acct. folio 4 Ledger B	12	15				
		31	50				
1810	*Dr.* *Thomas*			1810	*Hunter.* *Cr.*		
12 mo. 8	To 3 bushels of Coal	3	75		By acct. folio 4 Ledger B	3	75

(11)	*Dr.*	***Peter Thomson,***		***Contra*** *Cr.*		
1810						
10 mo. 12	To Sundries	106	20	By acct. folio 4 ledger B	106	20
1810	*Dr.* ***Edward***			***Young,*** *Cr.*		
12 mo. 23	To 3C. 1 qr. cheese	13	33	By act. folio 4 Ledger B	13	33
1810	*Dr.* ***Balance,***			*Cr.*		
	James Elford,	152	27	*Robert Barber,*	99	00
	Aaron Ableman,	167	00	*Mary Grey,*	13	86
	Thomas Lawson,	51	43	*Thomas Grey,*	12	15
	Nicholas, Norton,	73	76		125	01
	Roger Retail,	100	00			
	Conrad Compound,	121	29			
	Samuel Edwards,	4	52			
	Thomas Hunter,	3	75			
	Peter Thomson,	106	20			
	Edward Young,	13	33			
		793	55			

Ledger B.

THE ALPHABET.

A	**B**	**C**
Aaron Ableman, 1	*John Baker,* 3 *Richard Barber,* 3	*Conrad Compound,* 2
D	**E**	**F**
	James Elford, 1 *Samuel Edwards,* 3	
G	**H**	**I**
Mary Grey, 3 *Thomas Grey,* 4	*Thomas Hunter,* 4	
K	**L**	**M**
	Thomas Lawson, 1	
N	**O**	**P**
Nicholas Norton, 2		
Q	**R**	**S**
	Roger Retail, 2	
T	**V**	**W**
Peter Thomson, 4		
X	**Y**	**Z**
	Edward Young, 4	

(1) *Dr.* *James Elford.* *Contra* *Cr.*

1810	To acct. folio 1 Ledger A	152	27		*Cr.*		

Dr. *Aaron Ableman,* *Cr.*

1810	To acct. folio 3 Ledger A	167	00				

Dr. *Thomas Lawson,* *Cr.*

1810	To acct. folio 2 Ledger A	51	43				

(2)

	Dr. *Nicholas Norton,*				*Contra* *Cr.*		
1810	To acct. folio 5 Ledger A	73	76				
1810	*Dr.* *Roger*				*Retail,* *Cr.*		
	To acct. folio 6 Ledger A	100	00				
1810	*Dr.* *Conrad*				*Compound,* *Cr.*		
	To acct. folio 7 Ledger A	121	29				

(3)	*Dr.*	*Samuel*	*Edwards,*		*Contra*	*Cr.*	
1810	To acct. folio 8 Ledger A	4	52				
	Dr. *Richard*			1810	*Barber,* *Cr.* By acct. folio 8 Ledger A	99	00
	Dr. *Mary*			1810	*Grey,* *Cr.* By acct. folio 9 Ledger A	13	86